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Revisionary Studies in the Ant Tribe Dacetini

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Introduction

The tribe Dacetini is a rather large group containing 27 described genera and about 260 or 270 described and undescribed species presently in collections. In stating the number of species, I have excluded all the synonyms known to me in the tribe. The Dacetini have been placed by all relatively recent major authors in the subfamily Myrmicinae of the single family representing all ants, the Formicidae. The placement with the Myrmicinae appears the most correct situation for the present, but the tribe seems so distinctive in many ways important to phylogenetic considerations that future revision of the subfamily, now so hopelessly tangled systematically, may see the Dacetini separated as an independent group.

Like the remainder of the *Myrmicinae*, all dacetines possess a two-segmented, clearly differentiated pedicel and a well developed sting. Characterization beyond this is extremely difficult due to the great number of exceptionally bizarre modifications found among the genera, some of which have developed secondarily characters conferring non-dacetine habitus of a type convergent to that of ants in other tribes.

However, it may be stated that any myrmicine ant having (a) less than six segments in the antennal funiculi together with whitish spongiform appendages or thin lamellate lateral wings on either or both nodes of the pedicel, or (b) having a flattened, more or less pyriform head, narrowed anteriorly and with a deep, broad posterior occipital excision in combination with a pair of elongate, linear mandibles, each bearing two or three large apical teeth and an oblique, usually partly concealed spine or tooth at the base of the inner border, or (c) showing a combination of the characters of (a) and (b), is a member of the tribe Dacetini.

The reasons for the exclusion from the tribe Dacetini of *Peronomyrmex* Vieh Meyer, *Weberidris* Donisthorpe and the genera related to *Basiceros* Schulz and *Rhopalothrix* Mayr have been given in some detail in Part IV of this revision (1949). In my opinion, none of these genera can be considered at all closely related to any true dacetine genus.

In their habits, the very great majority of dacetine species are probably to be considered cryptobiotic predators of Silvestri's "microgenton." In the *Strumigenys* complex, species of at least two genera are known to feed on *Collembola* almost to the exclusion of any other prey. The normal prey of the other complexes is not known, but I hope to be able to give information on these at a later date. A few of the primitive species, such as *Daceton* of Amazonia, are arboreal, epigaic huntresses, apparently lying in wait for their prey on the bark of trees and in similar situations. The spiny armature so well developed in *Daceton* shows that it is primarily arboreal, and this is further confirmed by the large and prominent eyes. *Daceton* seems by all odds to be the most primitive living dacetine, and the presence of similarly-placed but reduced spines in other primitive genera now inhabiting the soil or other cryptobiotic environments seems to indicate that relegation to the microgenton has been a secondary measure forced upon the great majority of dacetine species as a retreat before superior competitors.

Subtribal Grouping of the Dacetine Genera by "Generic Complexes"

The Dacetini may be grouped into five generic complexes probably reflecting major phyletic lines. *Hypomyrmex* Emery is known only from a single specimen in the Sicilian (Miocene) Amber, and its relationships are presently unclear. The four remaining (Recent) complexes are listed with annotations:

DACETON COMPLEX

Eyes dorsolateral or lateral; antennal funiculus with 10 segments. Palpi segmented 5, 3.

Genera: *Daceton* Perty and *Acanthognathus* Mayr, both Neotropical.

ORECTOGNATHUS COMPLEX

Eyes lateral; funiculus 4-segmented, the second segment long. Palpi segmented 5, 3.

Genera: *Orectognathus* Fred. Smith and *Arnoldidris* Brown, both Australasian.

EPOPOSTRUMA COMPLEX

Eyes dorsolateral; funiculus 3- or 5-segmented, second segment not longer than the rest. Palpi segmented 5, 3.

Genera: *Epopostruma* Forel, *Alistruma* Brown, *Mesopostruma* Brown, *Clarkistruma* Brown, *Colobopstruma* Wheeler, *Hexadacton* Brown (Australasian) and *Microdacton* Santschi (Ethiopian).

STRUMIGENYS COMPLEX

Eyes ventrolateral, placed within or beneath the antennal scrobes; antennal funiculi with 3, 4 or 5 segments, the apical segment much the longest. If with 5 segments, the second and third are usually much reduced. Palpi much reduced, segmented 1, 1 in all examined.

Genera: The *Strumigenys* complex contains 16 presently recognized genera, distributed widely over the planet in tropical and temperate regions. The genus *Strumigenys* alone contains more than half of the known dacetine species (described and undescribed), and the whole complex accounts for approximately nine-tenths of the species in the tribe. The generic organization of the complex will be treated separately below.

The relationships among the five major complexes or subtribes are not very evident, but it does seem clear enough that the *Strumigenys* complex is the most highly derivative and probably the most recently evolved of these, chiefly because of the very great reduction of the maxillary and labial palps. The dacetine worker archetype probably combined the form and polymorphism of *Dacton* with the sculpture of *Acanthognathus*, *Epopostruma*, etc., and it must have had ten-segmented funiculi and a 5, 3 palpal formula. It undoubtedly had long paired spines on the pronotum and mesonotum as well as on the propodeum, and it seems that the nodes of the pedicel may also have had bilaterally-paired teeth of some kind. It was probably arboreal or subarboreal in habit. It gave rise to what must have been a flourishing group in the geological past, and the members of this group showed radiation and adaptation to a number of different habitats, including the cryptobiotic ones.

Adaptation to the cryptobiotic environments progressed in a somewhat convergent way in several branches of the group that had differentiated; the spinose armature became weaker and began to disappear, the body size and eyes grew smaller together. The sculpture altered and became finer, the worker polymorphism of the more primitive forms reduced to a highly restricted monomorphism, and fusion of the funicular segments progressed rapidly. All of these modifications may be seen today in other ant tribes that have produced cryptobionts from an epigaeic stock. In the dacetines, one of the interesting convergent lines of development has concerned the *Epopostruma* and *Strumigenys* complexes, both of which have produced forms with secondarily shortened triangular mandibles with serially dentate or dentic-

ulate masticatory borders. This has apparently come about in different ways in the two complexes, and appears to be happening a third time in the case of the series *Strumigenys*-*Pyramica*-*Neostruma* (see figs. 35-38). In the *Epopostruma* complex, the series *Epopostruma*-*Mesostruma*-*Alistruma* shows very clearly how the *Epopostruma* type of mandible, similar to that of *Strumigenys*, has gradually had its inner border extended mesially and filled in with thin, transparent chitinous lamella, and how this lamella has gradually thickened, become opaque and developed denticulae along its masticatory margin to end as the superficially commonplace border of an ordinary-appearing triangular mandible.

The same two complexes are also remarkable in both having produced species with thin, complicated and involuted lamelliform structures on the sides of the pedicellar nodes. While universal as "spongiform appendages" in the *Strumigenys* complex, these convergent structures appear only in the more derivative genera of the *Epopostruma* complex.

After many such modifications had appeared among the dacetines, something happened to the arboreal forms; probably they were pushed nearly out of existence by more efficient competitors among the ants or other insect groups. *Daceton* remains to show us what a relict of this probably once-powerful fauna is like. Unfortunately, although *Daceton* is common and conspicuous in the Amazon-Orinoco Basins and has been observed and collected on many occasions, no one seems to have recorded its feeding habits or other important ethological points of great interest. The most suggestive observation is that of Mann (1916):

"There were several colonies of *Daceton armigerum* in the grounds of the Zoological Garden at Pará, where workers were very often seen on the fences and trees. At Itacoatiara I found a very large colony nesting in a hollow standing tree."

Otherwise, *Daceton* is of great interest historically, for it so happens that it was the first dacetine ant to be described. Latreille gave the single species the name "*Formica armigera*" in 1802. No other species was reported until 1853, when Frederick Smith described *Orectognathus antennatus* from New Zealand. The much smaller European and North American species of *Strumigenys*, *Smithistruma*, *Trichoscapa*, etc. had gone unnoticed all this time, and most of them were to remain unknown for several decades even at that late date.

The history of the dacetines has been largely one of scattered descriptions, with no realistic revision and little critical appraisal of any of the described species. Therefore, the tribe was exceedingly ripe (not to say overripe) for a major revisionary effort. The task is so large that it can be effectively attempted by this author only in parts. The work recorded in this revision to date includes about one-third of the necessary changes, though most of the remainder is in various stages of completion. It is thought that at least the generic arrangement presented will survive major changes for a considerable time.

Reference Collections of Dacetini

The present revision is based on direct examination of a majority of the types of older species, made possible through the kindness and patience of

curators or owners of collections all over the world. In cases where unique types could not be sent, I was almost always able to obtain camera lucida drawings and other critical information enabling me to place questionable forms with satisfactory accuracy. Only because of such admirable cooperation is it now possible to attempt a taxonomic treatment of the entire world fauna.

Before the present time, no single collection has held more than a fraction of the described dacetine species. The scattering of types has been very wide, a fact that has added considerably to the difficulty of assembling this work on a world basis. Due to the former unavailability of types and the extremely confused state of the literature, many collections, particularly those in the New World, have accumulated surprisingly large stores of undetermined material.

New species among this material have come to light with such unexpected abundance as to seriously hamper the progress of the work toward its original revisionary goal. This is particularly true of the unworked collections of the Museum of Comparative Zoology, the United States National Museum, and of Dr. W. M. Mann.

The new species have proven helpful, however, in providing a basis for exchange with Old World collections and also for dividing New World collections in a mutually more useful way.

The extensive exchanges carried on in the course of the revision have raised the general quality of most dacetine collections in both hemispheres to a degree which, it is hoped, will permit the interested specialist to identify at least the commoner species from specimens deposited within reasonable travel distance.

The Museum of Comparative Zoology has been selected as the key place of deposit, chiefly because it has furnished the largest amount of exchange material from any single collection, but also because it already contained a nucleus of types and other identified material at least equal to that of any other collection in the world.

Due to the fact that series studied were so often limited in numbers, apportionment in outgoing exchange was necessarily made as nearly equivalent to the material received as was possible. Under these circumstances, the possibilities of building a personal reference collection for myself were so limited that I have considered it more logical to forego efforts in this direction.

In the list following, I have set down the principal collections containing taxonomically important dacetine series, together with the name of the owner or institution of deposit and the abbreviations for the same used in the body of this work. The abbreviations [in brackets], where used with descriptions, denote specimens on deposit.

Academy of Natural Sciences, Philadelphia, Pennsylvania—[ANS]. Agricultural Research Institute, Pretoria, Union of South Africa—[ARISA]. American Museum of Natural History, New York City—[AMNH]. Dr. George Arnold (personal) and in National Museum of Southern Rhodesia, Bulawayo, Southern Rhodesia—[Arnold Coll.]. Father Thomáz Borgmeier, Rio de Janeiro, Brazil—[Borgmeier Coll.]. British Museum (Natural History), London—[BMNH]. California Academy of Sciences, San Francisco, California—[CAS]. Chicago Natural History Museum, Chicago, Illinois—[CNHM]. Mr. John Clark, Melbourne, Victoria, Australia—[Clark Coll.]. Sr. Mario Consani, Florence, Italy—[Consani Coll.]. Emery Collection, Museo Civico di Storia Naturale, Genoa, Italy—[Emery Coll.]. Forel Collection, Musée d'Histoire Naturelle, Geneva, Switzerland—[Forel Coll.]. Finzi Collection: deposited in Museum of Compara-

tive Zoology, which see. Hungarian National Museum, Budapest—[Hung. NM]. Illinois State Natural History Survey, Urbana, Illinois—[INHS]. Dr. W. M. Mann, National Zoological Park, Washington, D. C.; personal collection, kept in U. S. National Museum, which see—[Mann Coll.]. Mayr Collection, Naturhistorisches Museum, Vienna—[Mayr Coll.]. Musée du Congo Belge, Tervuren, Belgium—[MCB]. Museum of Comparative Zoology at Harvard College, Cambridge, Massachusetts, U. S. A.—[MCZ]. Easily the largest and most important single existing aggregation of dacetine material. Includes the Wheeler Collection and several substantial additions, among them many types of Mann, Weber, Forel, Emery, Mayr, Santschi, Menozzi, M. R. Smith, the Wessons, Arnold, Borgmeier, the present author and others. The collection of the late Bruno Finzi was added during 1950. Naturhistorisches Museum, Hamburg, Germany—[NM Hamburg]. The dacetines on deposit here may have been destroyed by bombing during the war, though this is at present unconfirmed. Roger Collection, see Zoologisches Museum der Universität, Berlin, Santschi Collection, Basler Naturhistorisches Museum, Basle, Switzerland—[Santschi Coll.]. Stitz Collection, see Zoologisches Museum der Universität, Berlin. United States National Museum, Washington, D. C.—[USNM]. Dr. Neal A. Weber, Swarthmore College, Swarthmore, Pennsylvania—[Weber Coll.]. Wesson Collection, see Museum of Comparative Zoology, Wheeler Collection, see Museum of Comparative Zoology. Dr. Keizō Yasumatsu, University of Kyushu, Fukuoka, Japan—[Yasumatsu Coll.]. Zoologisch Museum en Laboratorium, Buitenzorg (Bogor), Indonesia—[ZMLB]. Zoologisches Museum der Universität, Berlin, Germany—[ZMZB].

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In the list which follows, I have tried to mention the names of all the individuals who have made this work possible, either through loan, gift, or exchange of material (m), or through other sorts of assistance (a) that cannot be detailed here. Where the aid has involved specimens or information concerning specimens from one of the major collections listed above, the abbreviation for the collection follows the individual's name; unless otherwise stated, the individual is associated through curatorship or ownership or otherwise closely with the particular collection concerned.

Miss Mary E. Amstutz, Ashland, Ohio (m). Dr. George Arnold (Arnold Coll.; m, a). Dr. Pierre Basilewsky (MCB; m). Dr. J. C. Bequaert (MCZ; m, a). Dr. F. Bernard, Université Alger (Santschi Coll.; a). Dr. H. Bischoff (ZMB; a). Dr. F. Bonet, Escuela Nacional de Ciencias Biológicas, Mexico City (m). Father Thomas Borgmeier, OFM (Borgmeier Coll.; m, a). Professor F. M. Carpenter, Harvard University (a). Dr. J. W. Chapman, Silliman Institute, Dumaguete, Philippine Is. (m). Mr. F. Y. Cheng, Harvard University (m, a). Mr. Kenneth Christiansen, Harvard University (m, a). Mr. John Clark (Clark Coll.; m, a). Dr. A. C. Cole, Jr., University of Tennessee, Knoxville (m, a). Sr. Mario Consani (Consani Coll.; m, a). Dr. K. W. Cooper, Princeton University (m). Dr. W. S. Creighton, College of the City of New York (m, a). Dr. A. Diakanoff (ZMLB; m). Miss Ruth Dunn, Harvard University (a). Mr. H. St. J. K. Donisthorpe (BMNH; m, a). Mr. H. S. Dybas (CNHM; m). Dr. W. Eichler, Parasitologisches Institut der Universität Leipzig (a). Dr. J. C. Faure (ARISA; m). Dr. Charles Ferrière (Forel Coll.; m, a). Dr. S. W. Frost, The Pennsylvania State College (m, a). Dr. C. J. Goodnight, Purdue University (m). Dr. Delfa Guiglia (Emery Coll.; m). Dr. E. Handschin (Santschi Coll.; a). Dr. E. M. Hering (ZMB, a). Lt. J. W. Jones, Jr., U. S. A. F. (m, a). Father W. W. Kempf, OFM, Cornell University (a). Dr. C. H. Kennedy, Ohio State University (m). Dr. Nicolás Kusnezov, Instituto Miguel Lillo, Tucuman, R. Argentina (m). Sr. Frederico Lane, Secretariat of Agriculture, São Paulo, Brazil (m). Dr. M. A. Lieftinck (ZMLB). Mr. Arthur Loveridge (MCZ; m, a). Father John McAreavey, SJ, Xavier College, Melbourne, Australia (m). Dr. W. M. Mann (Mann Coll.; m, a). Mr. G. E. J. Nixon, Imperial Institute of Entomology, London (BMNH; a). Mr. W. L. Nutting, Harvard University (a). Dr. Kikumaro Okano, Numazu, Japan (m, a). Dr. Orlando Park, Northwestern University (m). Mr. D. W. Pfitzer, University of Tennessee, Knoxville (m). Dr. Bruno Pittioni (Mayr Coll.; m, a). Mr. J. A. G. Rehn (ANS; m, a). Dr. E. S. Ross (CAS; a). Father Jerome Rupprecht, St. Vincent Archabbey, Latrobe Pennsylvania (m). Dr. George Salt, Kings College, Cambridge, England (m). Mr. H. F. Schwarz (AMNH; m). Dr. M. R. Smith (USNM; Mann Coll.; m, a). Mr. L. J.

Stannard (INHS; m, a). Dr. A. Stärcke, Den Dolder, Netherlands (m). Dr. Mary Talbot, Lindenwood College, St. Charles, Missouri (m, a). Mr. Ernest Taylor, Hope Department of Entomology, University Museum, Oxford, England (m). Mr. B. D. Valentine, University of Alabama (m). Mr. Arnold Van Pelt, University of Florida (m). Dr. N. A. Weber (Weber Coll.; m, a). Mr. F. G. Werner, Harvard University (m, a). Dr. L. G. Wesson, New York University College of Medicine (m, a). Mr. R. G. Wesson, San Jose, Costa Rica (m). Dr. G. C. Wheeler, University of North Dakota (m). Mr. E. O. Wilson, University of Alabama (m). Mr. John Woodland, Harvard University (a). Dr. D. L. Wray, North Carolina Department of Agriculture, Raleigh (m). Dr. Keizō Yasumatsu (Yasumatsu Coll.; m, a).

During the three years this work has taken, I have benefitted enormously from the everlastingly patient and wise counsel of my thesis advisor, Professor F. M. Carpenter. He would be the last to claim a share of the credit for any small success this work may enjoy, but if credit there is, a large part of it is certainly his.

Measurements and Proportions

In general, the dacetine species show very strictly limited variation in dimensions and proportions compared to other ants. The total length, degree of elongation of head, length of mandibles, etc. can be reduced to numerical values of high constancy, and in this revision the numerical values are treated as of the very first importance. Unfortunately, former authors either disregarded dimensions and proportions entirely, or else gave such vague and often patently inaccurate values that I have had to ignore most former statements concerning them except as they might be used as the roughest sort of taxonomic clues. I have thus had laid out for me the enormous task of measuring and calculating proportions not only for the new species described during the course of this work, but also for the entire array of previously described forms.

In most cases, I have been able to see types or other reliable material of the older forms. Data based upon these naturally vary in usefulness with the number of specimens measured. In several cases where specimens were not available for study, published figures have allowed at least a rough estimate of proportions of head and mandibles. Estimates made from figures are, of course, subject to the errors made in the original sketch, and experience has shown that former authors were often none too careful in preserving accurately the proportions in their figures. About 8,000 specimens have been subjected to an average of 5 measurements each, so that over 40,000 actual measurements have been made in the three years covered by this work.

In obtaining these measurements, it was early obvious that more rapid and accurate methods than those conventionally used would have to be devised. The following apparatus was used with very good results: (1) A wide-field binocular (stereoscopic) microscope, objectives powered 1.7X, 4.8X, 6.8X; oculars powered 12.5X, 25X, 30X. The 4.8X objective with the 12.5X ocular, giving a magnification of 60X, was used almost constantly in measuring. (2) An ordinary squared ocular disc, such as is commonly used in making sketches. A disc was chosen of such calibration that, with the 4.8X objective, each square of the disc marked off a square 0.2 by 0.2 mm. on the object as viewed. This choice of calibration overcame a difficulty which would have made the enormous number of calculations virtually impossible, since the value in millimeters could be calculated simply by multiplying by a factor of 0.2 the observed measurement in ocular disc graduations. The

standard ocular micrometer was rejected at the beginning of the work, since, although its graduations were finer, the counting of units proved altogether too slow and open to error by miscounting. The unit of 0.2 mm. could be subdivided by estimation to an accuracy of the order of $1/20$ of a disc interval, or to within 0.01 mm. Actually, estimation by the practiced eye proved to be capable of even greater accuracy, as was shown by subsequent checking of selected measurements. In any event, the error due to inaccuracy of estimating the scale was less than that due to differences in positioning and other factors such as indistinct margins under dense pilosity, etc. If, as is usual with squared discs, one of the squares is further subdivided, the doubtful estimates may be checked with greater accuracy. A specially made disc with graduations just half as broad as those on my disc would be ideal for such measurements, since not only would more accurate estimation of fractions be possible, but also the calculations would be reduced to a mere shift of the decimal point. Unfortunately, such a disc was not available for this work.

(3) A small manipulator consisting of base, horizontal axis with semi-circular arm, and, affixed to the arm, a disc rotating upon a second axis perpendicular to the first, this disc with a central aperture for cork or other material into which the insect pin is inserted. With this instrument one can rotate the insect slowly under the microscope until reaching the most advantageous viewing angle, upon which the position will be held firmly until a change is desired. Operation is manual. The base of the manipulator was placed in (4) a standard mechanical stage fixed to the ordinary glass stage of the microscope. The mechanical stage afforded a rapid and accurate means of bringing the insect into exact juxtaposition with the graduations of the ocular micrometer.

The apparatus described is rather complicated in operation, since there are four separate controls to handle in addition to the focussing of the microscope and rotation of the ocular disc to the desired position for measurement. However, after a bit of preliminary fumbling, operation became second nature and went so much more rapidly and accurately than the conventional and very uncertain methods of measurement by adjusting and readjusting the insect pin in a stationary cork that the latter soon became unthinkable. A warning is here sounded to those who would identify dacetines, with or without this paper: unless already very well acquainted with the species of the tribe, the specialist will almost necessarily have to provide himself with an apparatus similar to that described above, or at least one operating with a like degree of ease and accuracy. Dimensions and proportions are quite necessarily used in specific and even generic determinations; a lesser degree of accuracy than that here specified will cause serious difficulties in obtaining a correct identification for almost any species.

Even with the best apparatus, there are certain other very important factors which must be taken into account when measuring dacetines (or any other ants). Positioning is the most important of these, and is involved with the further pertinent problem of what to measure. Various means have been suggested by entomologists for obtaining measurements that will be standard from one specimen to another as measured by anyone. The means seemingly most often used (though statements concerning it seldom accompany descrip-

tions) is plain visual judgment, although fillips such as "getting the two sides in the same plane or focus" are employed by some as qualifications to the judgment method. Such a method is far too crude for the present purposes.

The method of positioning which I have followed does not seem to have been set down very clearly in the entomological literature, although it is assumed that it has been tacitly followed by at least some former workers. The theoretical basis of the procedure rests upon the proposition that, given two definite limits separated by a distance to be measured under a microscope, the *maximum* distance that can be made to appear between the two limits as seen by one eye is the only really accurate standard measurement. This maximum measurement as a standard is apparent when a long, slender object, such as an antennal scape or a tibia is being measured, and I have no doubt that most entomologists consciously or unconsciously employ it. It is not so apparent, however, in dealing with thicker, broader objects like the head, and it is with such objects that standards of proper measurement are woefully lacking in ant taxonomy. Part of the difficulty has been that with the older methods of positioning, using only a stationary cork, it has been impossible to closely approach the critical maximum with any certainty. The manipulator eliminates most of this uncertainty because it may be rotated slowly and smoothly enough that, when turning through the point at which the critical maximum is reached, the actual advance and retreat of the dimension against the ocular grid may be watched in progress and stopped at the proper point. With a stationary cork, the position must be shifted by removing and reinserting the pin so that only a discontinuous change in apparent dimension is ordinarily possible.

Needless to say, the critical maximum measurement is used throughout this revision.

With the problem of positioning settled by the only practicable standard method, the question of what should be measured becomes acute. Part of the answer lies with that to the positioning problem, for it is obvious that if the greatest possible dimension that can be made to appear is the one measured, then the reference points must be the opposing extremities of the part examined. Even so, considerable qualification is necessary if actual measurements are to mean anything, since the position of the insect as it is mounted in death often raises difficulties.

As mounted on a point or card, the body of the ant is not usually fully extended along one axis. The head is often bent downward at an angle to the alitrunk, and the petiole, postpetiole and gaster usually are bent with respect to one another so as to form a sort of arch. A study of measurements given by past authors for dacetine ants shows that most of them gave only a "total length." While most descriptions do not so state, it appears that the mandibles were included in this length in the great majority of cases. In cases where unique types were involved, I have carefully remeasured some of these specimens in order to gain an idea of the methods used by various authors in making measurements. Without going into detail, I can state that the overall length of the ants has almost invariably been underestimated. This is due, in my opinion, to a measurement involving a single linear spread from the part of the ant which happened to be most anterior to that which hap-

pened to be most posterior on the particular specimen examined. Only by making a single linear measurement, ignoring the relative positions of the various parts of the insect, have I been able to come close to duplicating the values published in the older papers. Such a measurement is probably nearly always made from dorsal view, and utilizing this view it is entirely possible to get a measurement for specimen A, an insect happening to be larger but in a more compactly contorted position, that is smaller than the measurement for the actually smaller, but more extended specimen B.

It is obvious from this that older measurements are not at all comparable one against another. Furthermore, older authors did not consider the accuracy of the measurements to be important, and most of them followed the practice of stating the dimension to the nearest half or third of a millimeter. In the measurement of large ants, such considerations are not very important, chiefly because the percentage of error (compared with the method here recommended) varies under the old system inversely with the length of the insect. In the dacetines the error in older measurements (as compared to those given in the present work) may be as high as 50%. By this I mean that an ant measured in a former work to be "1½ mm." may, if carefully and fully stretched out, be found to measure as much as 2.25 mm. The chief objection to such measurements, which are presently seen to be extremely important in the dacetines, is not that they are consistently smaller than my own, but rather that they are so completely lacking in standard reference value. Every author followed his own idiosyncratic method of measurement, and none stated the method used; these measurements are valueless for present purposes except used indirectly as the crudest of indicators of overall dimensions.

While it is easy to damn completely the old methods, the devising of a practicable standard way of gaining comparable measurements is not so easy. Various authors, such as Arnoldi, Weber and other recent myrmecologists, have suggested measuring the greatest (diagonal) length of the "thorax" from the side view, since that is often the longest completely rigid section of the body. This measurement has been suggested chiefly to overcome the variability in the gaster, which in some ant genera may be greatly distended or strongly shrivelled according to the specimen and conditions of its preservation. I agree that this measurement is generally satisfactory, and I have used it throughout the revision as "Weber's length" or "WL." Weber has stated it clearly, with diagrams, in his paper on dimorphism in African *Oecophylla* (1946). I have discussed the qualifications used with regard to it farther below.

The original reason for the use of Weber's length does not apply very well in the dacetines, however, for in this tribe the gaster usually varies but little in size. I have considered it helpful to give a measurement expressing to some degree the overall length of the insect at its fullest linear extension. Although it may be doubted that such full extension ever is seen in mounted specimens, or even that it occurs in living individuals, the method I shall outline below seems to me the only way of accomplishing a general linear body measurement that will be comparable from one species to another.

This method entails the summation of a series of linear measurements made upon the rigid sections of the body as follows:

Head length: Critical maximum length of the head, measuring from a transverse through the posteriormost point or points along the posterior occipital border to a transverse through the anteriormost point or points on the anterior clypeal border. In order to avoid ambiguity, a start in the progressive positioning is arbitrarily set as the "conventional" full face or dorsal view. A position that gets too far from this would be of little use, but such a position short of an absolute ventral view of the head will not occur at the critical maximum dimension in any dacetine species known to me. One possible question is raised, however, by the presence of teeth or spines on the occiput in genera like *Microdacton* and *Hexadacton*. In these cases, where the teeth are small and often distinct, measurement should either exclude them completely (as in this revision), or if the situation is ambiguous because of the broadness of the teeth, then the decision as to whether they should be included in the total measurement of the head or not should be covered by a special statement of the method used. In the measurement of dacetine ants, the mandibles and other mouthparts are pointedly excluded from the dimensions for the head for obvious reasons of relative development and because the comparison of the linear dimensions of the head proper and the exposed portions of the mandibles furnishes one of the most important quantitative characters used in this work. The symbol used throughout this work for the linear longitudinal critical maximum measurement of the head, as qualified, is "HL."

Exposed length of mandibles: Due to the fact that the majority of dacetine species have relatively elongate mandibles, and because the differences in degree of elongation furnish important taxonomic characters, this dimension is measured separately. As arbitrarily defined here, the exposed mandibular length is not the critical maximum exposed length, but is the length of the mandibles, when closed, as viewed while the head is in the same viewing angle (with respect to the microscope) from which HL was first determined at its critical maximum. This is mentioned because the mandibles are often naturally tilted dorsad or ventrad from the principal axis of the head. The measurement is made in this plane of view from the transverse through the anteriormost point or points on the anterior clypeal border to the extreme apical point of the most advanced mandible. In practice, this measurement will vary a little more in a given series of specimens than will that for HL, since the mandibles are found closed in different ways and are retractile to a very slight degree. Where the mandibles are very short and more or less arched, as in some smithistrumiform genera, this measurement may vary proportionately more than in long-mandibulate genera; in such cases, its value is reduced. The symbol used in this work for the exposed mandibular length, as qualified, is "ML."

Length of alitrunk: This is the "Weber's length of thorax" referred to above. The alitrunk is here defined as the true thorax (i.e., the first three postcephalic or postgnathal segments of the body, or the three leg-bearing

segments of adult insects, as defined by various morphologists) plus the propodeum (i.e., the first segment of the true abdomen, in all clistogastran Hymenoptera included in the second major tagma of the body and fused with the true metanotum). In most myrmecological works, the second tagma of the body is wrongly called the "thorax" as a holdover from the early period when the propodeum plus the metanotum were thought to represent the metanotum in its entirety. Since the term "epinotum" was originally very vaguely defined by Emery, and since it has been used to mean propodeum plus metanotum in at least part of the subsequent literature, on several occasions by Emery himself, it should be rejected in favor of the earlier and more generally-used term for this typical clistogastran structure, "propodeum."

In the dacetine ants, the pronotum is usually marked off from the "neck" by a curved transverse dorsal margin. When present, the anteriormost point reached by the margin usually is even or nearly even, seen from a directly lateral view, with the posteriormost level reached by the occipital lobes. For this reason, the pronotal border makes a very convenient reference point in measuring the alitrunk. In the rare cases where this margin is absent or indistinct, measurement is made from the base of the anterior pronotal slope, which in all such cases coincides very well with the point of juncture of the "neck." In a few cases, such as in *Strumigenys* of the *chyzeri* group, the occipital lobes project backward so far as to overlap the anterior portion of the pronotum. In such species, no change is made in the anterior reference point for the measurement of the alitrunk, but an account is taken of the overlap to be stated after the figures given for the general linear dimension of the body. The main point to be observed in measurement, I think, is that care should be taken to state the actual situation in all exceptional cases. In a tribe as large and diverse as the Dacetini, no blanket statement can hope to cover every single structural aberration.

The posterior reference point is taken as the posteriormost extremity of the small lobe at the so-called "metasternal angle" of the posteroventral alitrunk. One of these small lobes projects posteriorly to a slight degree on each side of the point of articulation of the petiolar peduncle, each is more or less closely associated with the metapleural gland housing, and if the view is perpendicular to the sagittal plane of the alitrunk, only the one on the side toward the observer should be visible. This point, the extremity of the metapleural lobe, is the posteriormost point reached by the alitrunk on either side if the very variable propodeal teeth and infradental lamellae be ignored.

When the insect is held in such a position that the sagittal plane of the alitrunk is perpendicular to the axis of view, the measurement taken is along a straight "diagonal" connecting the anterior pronotal margin with the posterior extremity of the metapleural lobe. This measurement of the alitrunk, as qualified above, is indicated by the symbol "WL" throughout the work.

Length of petiole: In the usual position assumed by dacetines as mounted, the petiole is at an angle with the principal axes of both the alitrunk and the postpetiole-gaster. It must therefore be measured separately. Measurement from lateral view is easier and more accurate; the visible length along the

natural axis of the segment, limited anteriorly by the posteriormost point of the visible metapleural lobe and posteriorly by the articulation with the postpetiole, is the most logical distance to measure. Since the petiole is normally a small segment, and since the only use to which I have put its measurement is in arriving at a more accurate general linear measurement for the body, small errors may be made in the measurement of this segment with negligible effect on the total dimension. This measurement has not been given except as a part of the general total for body length, so no symbol is required.

Length of postpetiole and gaster: The articulation between the postpetiole and gaster is limited in freedom of motion, and for this reason and because the postpetiole is short and of nearly the same dimension in either direction as seen in lateral view, only one linear measurement is necessary for these two parts in most dacetines. The position of view is a perpendicular to the sagittal plane of the parts in question, and the reference points are the imaginary center of the point of articulation between petiole and postpetiole and the posterior extremity of the gastric apex, excluding the sting or other parts obviously extruded. In the case of retractile male genitalia or other exceptions that may be encountered, a special statement of the situation is made.

Since the length of postpetiole and gaster is given only as a part of the total linear body measurement, no special symbol is required.

General linear body measurement or "total length": This is the sum of all the linear measurements discussed above, or $ML + HL + WL + \text{length of petiole} + \text{length of postpetiole and gaster}$. It must be stressed that this is a synthetic figure, possibly representing a length different from that produced by any position the ant might assume during life. It is felt, however, that no other means of obtaining measurements strictly comparable from specimen to specimen and with the necessary degree of accuracy has proven satisfactory. The objection that the measurements required are too many and too tedious for ordinary work will not hold, for with the proper apparatus as outlined above, the measuring may be done with surprising rapidity and accuracy. The symbol used throughout this work for the general linear body measurement is "TL."

Cephalic index: The critical maximum width of the head expressed as a percentage of HL, or $HW/HL \cdot 100$. The critical maximum head width in the great majority of the dacetines comes in the region of the occipital lobes. The measurement presents few difficulties. Occasionally, the pilosity of the occipital lobes obscures the borders, making it difficult to see the actual limits of the head; this can be overcome by reflecting the light from a white surface beneath the specimen so as to outline the head by contrast. The cephalic index is best computed from the raw data in terms of ocular grid units; this cuts down the error of calculation. The cephalic index is indicated by the symbol "CI."

Mandibulo-cephalic index: Exposed length of mandibles expressed as a percentage of HL, or $ML/HL \cdot 100$. Since both of the measurements needed

are normally made in any case, this index is simply a matter of calculation. In *Smithistruma* species, where the mandibles are short and vary somewhat in ML due to retraction, etc., the length of the mandibles is best expressed in terms of the index, and no absolute measurement is given. The mandibulo-cephalic index is indicated by the symbol "MI."

Index of cephalic depression: The greatest thickness of the head, in a direction perpendicular to the plane determined by the measurement of HL and HW, expressed as a percentage of HL. This index is open to slightly greater error of measurement than are others, and its use has been restricted mostly to cases where differences in cephalic depression between related species are quite distinct, or where the depression is extreme. The index of cephalic depression is indicated by the symbol "ICD."

Other measurements: I have attempted to put many other lesser measurements and proportions on some kind of a numerical basis, and I believe that these will be self-explanatory where found in descriptions. The letter "L" stands for critical maximum length, and the letter "W" for critical maximum width.

Error of measurement and calculation: Error in measurement must be kept to an absolute minimum if indices are to be calculated from the values, since otherwise the error may be so greatly multiplied in calculation that much of the significance of the final value will be lost. Error is caused by the limits of accuracy of the ocular grid, by failure to achieve the precise critical maximum positioning, by ambiguity of borders or other limits as seen on the insect, by lighting effects or other illusion, and by bias on the part of the observer. It is possible, of course, to determine the amount of error that may be expected in each size- or shape-class in the tribe. This has been done carefully for the measurements involving the head and mandibles, and more roughly for other measurements. Six specimens, representing forms as widely different in size and shape of head and mandibles as could be found in the tribe, were measured by the observer (myself) repeatedly at intervals great enough to allow the previous measurements to slip from possible recall. After ten such series of measurements, the values for each measurement were averaged, and the most extreme (high and low) deviations were considered as the maximum amount of error based on the average (mean). Except for one very gross error, which proved to be due to a lapsus, the differences were very small. In no case (except the one mentioned) was the amount of error greater than .01 mm., and in 81% of the measurements, the error was less than .005 mm. The errors were naturally more serious in the smaller measurements. As a final check, CI and MI were determined in random specimens of all shapes and sizes. The error here was never more than 2; in nearly 75% of cases, it was not more than 1. Several specimens checked by other observers agreed with my average values within the same error. It must be mentioned that all indices were calculated directly from the raw measurements in terms of ocular grid units, and not from the rounded-off millimeter values.

I shall present here a key to the symbols used in the text, their rough meanings, and their rough maximum errors:

Symbol	Measurement or proportion	Given in	Rough maximum error
TL	General linear body measurement (see qualifications).	mm.	$\pm .05$ mm. (?)
HL	Critical maximum length of head proper (see qualifications).	mm.	$\pm .01$ mm (usually less)
ML	Exposed length of mandibles (see qualifications).	mm.	$\pm .01$ mm (usually less)
WL	Weber's length of alitrunk (see qualifications and Weber, loc. cit.)	mm.	$\pm .01$ mm. (?)
CI	Cephalic Index (Critical maximum head width/HL $\cdot 100$)	units	± 1
MI	Mandibulo-cephalic index (ML/HL $\cdot 100$)	units	± 1
ICD	Index of cephalic depression (Maximum head depth/HL $\cdot 100$)	units	± 2

Certain of the errors differ from those expressed in earlier papers, but the present ones are based on a larger number of observations.

The standard measurements and proportions are usually stated in the descriptions in the order given above. In cases where a very large amount of material has been reviewed, the range of variation shown by the great majority of individuals of the species may be placed in parentheses after the full statement of range in order to show the usual dimensions that can be expected.

Statistical Treatment

During the early stages of this work, a great deal of experimentation was carried out with elementary statistical procedures. This experimentation was limited in application to forms of which material from a large enough number of different nests was available. In certain cases, such as that of the supposed variants of *Strumigenys louisianae*, it could be shown statistically that there was no significant difference between the colony-series tested. However, the same lack of significant difference was shown in the broad overlapping of the dimensions and proportions themselves. Since a significant difference of means in any measurable character shown by two colony-series would not necessarily show that the two series belonged to different species or races anyway, it appears obvious that statistical treatment in the present stage of dacetine taxonomy can offer no significant evidence that cannot be gained in easier and more obvious ways. When we finally come to the fine study of geographical variation, statistics may find a very useful application in confirming the existence of definable but obscure races and species.

Procedures for determining degrees of correlation between the numerically expressible characters found on the bodies of individual ants have a very useful application, however, in determining functional relationships between parts and also in demonstrating clearly the degree of polymorphism evidenced by

given colony-series. Parts of the revision in which such procedures can be used to advantage are still in progress, and will not be reported upon here. For the convenience of future workers who may care to use them biometrical-ly, I have saved the majority of my raw measurements on rough work-sheets, and I will make them available to anyone who shows evidence of using them for a serious and worth-while purpose.

Strumigenys Complex

A large assemblage of genera and species, worldwide in temperate and tropical regions. The complex may be divided into two subcomplexes, one "long-mandibulate" (strumigeniform genera) and the other "short-mandibulate" (smithistrumiform genera). This division is probably artificial, at least in part, since the phylogenetic relationships of all the genera are by no means evident. As has been stated in the introduction, the strumigeniform mandible is considered the primitive type in the entire tribe; it is almost certainly the ancestral mandibular form in the *Strumigenys* complex. Probably the short, serially-denticulate mandible has arisen from the elongate, apically furcate form on two or more occasions, although this is not clear at present. In at least one genus, the process seems to have reversed itself, for *Dorisidris* appears to be little more than a *Glamyromyrmex* with secondarily lengthened, apically furcate mandibles.

In the strumigeniform genera, I would place *Strumigenys*, including the two subgenera, *Labidogenys* Roger and *Pyramica* Roger, and *Neostruma* Brown. *Quadristruma* also falls here.

The smithistrumiform subcomplex contains quite a few genera, but most of these are monotypic or contain very few species:

<i>Borgmeierita</i> new genus	<i>Pentastruma</i> Forel
<i>Codiomyrmex</i> Wheeler	<i>Serrastruma</i> Brown
<i>Codioxenus</i> Santschi	<i>Smithistruma</i> Brown
<i>Dorisidris</i> Brown	s. str.
<i>Epitritus</i> Emery	<i>Platystroma</i> new subgenus
<i>Glamyromyrmex</i> Wheeler	<i>Wessonistruma</i> Brown
s. str.	<i>Tingimyrmex</i> Mann
<i>Chelystruma</i> Brown	<i>Trichoscapa</i> Emery
<i>Kyidris</i> Brown	<i>Weberistruma</i> Brown
<i>Miccostruma</i> Brown	

In addition to these, there is a single specimen in my possession, sent by Dr. Kikumaro Okano from Japan, representing a clear-cut new genus intermediate between *Epitritus* and *Smithisthuma* (*Wessonistruma*). Dr. Okano has intended to describe this form as a species of *Strumigenys*, but I hope that further study has convinced him of its distinctness from all previously described genera.

The genera *Quadristruma*, *Codioxenus*, *Dorisidris*, *Epitritus*, *Glamyromyrmex*, *Miccostruma*, *Pentastruma*, *Tingimyrmex* (see fig. 34), and *Trichoscapa* have been dealt with in published parts of this revision (1948, 1949) or in one part now in press. The remaining genera will be treated here or in parts of the revision to be published within a short time. The final sections will deal with *Strumigenys*, which contains more species than do all the rest of the dacetine genera combined.

SPECIATION IN THE STRUMIGENYS COMPLEX

The present study has included an intensive examination of far more dacetine material than has ever before been gathered together in one place. I may make one generalization on the basis of this material, it is this: at present there appear to be no populations in the tribe which can confidently be termed geographic races. The subspecies erected by former authors were found to be absolute synonyms of already existing species or else independent species in their own right. After careful consideration of each case on its own merits, all varieties among the dacetines have been synonymized, except for a very few which are raised to species rank because of purely nomenclatorial technicalities.

Compared to other ant groups of comparable size, dacetine subspecies and varieties were not commonly described by the older authors, a fact concerning this tribe which supports my finding that few if any races exist. Of course, it may be that among the great mass of dacetine species known only from one or a handful of collections there exist at least a few geographical races. The commoner, more widely distributed, and therefore better-collected species might be the ones most expected to throw territorial variants. In well-collected species like *Strumigenys louisianae* Roger, *S. biolleyi* Forel, and *S. elongata* Roger, there is, to be sure, considerable variation in size, proportions, color and other characters, but this variation appears more or less at random throughout the range. Several of these species were treated statistically, but the results so uniformly showed lack of a tendency toward geographical apportionment of quantitative characters that the technique was abandoned. The same widespread, variable species, however, were found in all cases to be distinct by more than one clearcut character from the most closely related species, and little difficulty was experienced in determining them once the synonymy was fully straightened out. The species of dacetine ants have in general proven much more distinct than are those of other similarly large ant tribes.

If the above considerations hold true after collections of dacetine species become more complete, there could arise at least two explanations:

1. The dacetines are a very old group, now contracting their range and existing for the most part as specialized relicts.
2. The dacetines form very small populations in highly specialized niches, and therefore, according to some biological theory, are more likely to form numerous, quickly isolated species.

Neither of these generalizations really explains very much. The first might be accepted by some, but recent evidence which has been accumulating shows that species of several widely differing genera, particularly in the *Strumigenys* complex, are neither uncommon nor very old, and that they are surprisingly often able to master new environments as efficient tramp species. The increasing use of the Berlese funnel reveals that the dacetines are not limited solely to moist forest habitats, for several species have been found in open areas which originally lacked forest cover.

The present study cannot hope to solve problems of speciation in the group, but it certainly suggests that the dacetines do not form species in exact-

ly the same way as do some old and widespread genera like, for example, *Monomorium*.

My definition of a species does not include the possibility of the occurrence of genetically isolated populations based on aberrant multiplication of chromosome numbers or on complete parthenogenesis, since neither phenomenon has been satisfactorily demonstrated in the ants. Instead, I follow three simple conditions which I believe are essentially those demanded by most modern zoological taxonomists.

1. The species is a population inhabiting a given territory.
2. This population is distinguished by possessing one or more characters different from those of other populations. Characters are morphological in the broadest sense, and may manifest themselves only in overt physiological or behavioral terms, or else may be completely undetected at present. In present-day formicid taxonomy gross external and a few internal morphological features are practically the only ones in which variation has been recorded sufficiently well to permit their use.
3. At least one of the characters present in the population (not necessarily the one most useful in identification) must act to prevent interchange of genes with another population when such interchange would result in a hybrid population able to maintain itself indefinitely in nature.

All of my species, at least theoretically, must satisfy all three of these requirements. According to modern theory, the only recognizable infraspecific category completely acceptable as a distinct population for taxonomic purposes is the geographical race, here called subspecies. The subspecific population must, to be distinguishable, satisfy the first two requirements above, but not the third, and it must therefore inhabit a territory distinct in the main from that occupied by other subspecific populations of the same species. In other words, subspecies must exhibit a high degree of allopatry behind at least partial barriers to genetic interchange. Where the two populations meet and overlap, a hybrid belt can and will occur. Reasonable proof of two subspecific populations would therefore consist, in cases where the two populations are contiguous in range, of convincing evidence of the *broad* allopatry of a character or characters and also of the intergradation of these characters along the line of territorial contiguity. In this concept, the various ecological and physiological races postulated by many writers, as well as "nest varieties" among ants, may not be accepted as valid subspecies.

A subject which requires special mention in connection with taxonomic concepts is that arising from the dissemination of certain relatively highly adaptable ant species through commerce. As I show in my preliminary revision (1948, pp. 113-114), several dacetine species have displayed surprising ability to act as transoceanic tramps. In genera such as *Trichoscapa* Emery and *Quadristruma* Brown, I have synonymized several forms because I believe that they are represented by migrant populations established within historic times. In these and many other ant genera which include tramp species, endless names have been set up on a morphologically unsound basis, since supposed differentiating characters are given undue weight in correspondence with the degree of presumed geographic "isolation" from similar populations.

Where thoroughly known, the parent stocks of the migrants usually have shown a degree of variation which embraces all the features of the derived populations. The conditions of the migration, however, are such as to restrict greatly the number of fertile females arriving on a given new shore at a given time, and this implies the establishment of a more restricted and therefore more homogeneous population in the new home than in the old.

Often the degree of variation of the parent stock within the original range is poorly known, hence the description of such forms as the *Myrmica laevinodis* variants from three separate seaport areas on the east coast of North America. I submit that such variants, providing that they are recognized as immigrant tramps, should be ruthlessly thrown into synonymy, since even if they stemmed from different subspecies of the parent species, the probability that each form could remain isolated from contact with genes of forms with which it is interfertile is very low. The distinct seeds of different populations entering at different points on the coast of a new insular or continental area can be expected to exchange genes with each other eventually through the agency of strays (reaching one area from another by means of commerce, winds or coastal currents) and also by expansion of their range until they are both permanent inhabitants of the same territory. Genes can also be expected to reach the new coast from the original range at any later time. The net effect of all this interchange, which can be expected to accelerate with the more rapid and therefore less rigorous conditions of transport, will be a tendency for the total population in the new territory to gain all or many of the genes shown by the original stock and thus become more and more similar to the latter in total variation. Until intensive biological studies of these forms are initiated, it would appear best to eliminate the taxonomic clutter of varieties and subspecies based on them. This is easily done in the *Dacetini*, where variation within a species is not often so great as in genera like *Myrmica*.

The nest varieties which most writers have insisted on naming to the extreme confusion of ant taxonomy are here firmly rejected as taxonomic entities.

Adequate characterizations of gross external morphology must be prepared for certain older species where few now exist. A start must be made in summarizing distributional and biological data, now scarcely existing for most species, and in preparing tables to assist in the identification. The present revision attempts some of these projects for the world fauna. It is not to be considered a hand manual for the layman, or even for the general entomologist, because the number of unknown species certainly exceeds that which I here recognize. The best that I can offer is a reasonably logical framework for the addition of knowledge of the dacetines by myrmecologists; it is hoped that the framework has been built broadly enough to survive the onslaught of new species which will surely come during the next decade, novelties which will inevitably make this work obsolete.

HISTORICAL NOTES

The history of the *Strumigenys* complex before my preliminary revision of 1948 is largely the history of the portmanteau genus *Strumigenys*. The same men who so eagerly engaged the difficult task of splitting larger genera like

Camponotus, *Crematogaster*, and *Aphaenogaster* often with very uncertain results had somehow overlooked the much more obvious generic and subgeneric entities gathered in *Strumigenys*. In 1922, Emery used the *Genera Insectorum* to crystallize the body of opinion which had slowly groped toward a division of the genus into two groups, one with "long" mandibles, the other with "short" mandibles. The final word of Emery was a vaguely defined division into two subgenera; the names decided upon, respectively, were *Strumigenys* sensu stricto and *Cephaloxys*. Emery also showed his extreme conservatism in regard to the group by placing Wheeler's *Codiomyrmex* as a third subgenus of *Strumigenys*, an act which failed to win recognition from American workers.

The division into two major subgenera continued until 1948, though M. R. Smith showed in 1943 that the name *Cephaloxys* was preoccupied and replaced it by the next available name, *Trichoscapa* Emery. In my revision of 1948, *Strumigenys* was separated into several large and small generic and subgeneric groups, and with further alterations in 1949, the generic and subgeneric grouping became that which I have outlined in a foregoing section.

The descriptions of the species which made up the old genus *Strumigenys* are extremely widely scattered in the literature, and their quality is in most cases poor. With certain exceptions, the characterizations and comparisons of Mayr and Emery are the best published during the earlier days, though Mayr gave no figures, and the figures by Emery are often untrustworthy. The species of Frederick Smith and Forel are generally poorly described and not or inadequately figured. Among modern works on the group, that of M. R. Smith is easily the best and most useful, though limited to the New World fauna. Work done by other authors since 1900 has been mixed in quality, though mostly on the poor side, and it is largely during this time that the inexcusable number of synonyms has been built up. Most of the synonymy is due to carelessness in checking descriptions in the genus before describing novelties, and to previous hastily done, incomplete descriptions and misleading figures. On the whole, the taxonomy of the dacetines may be said to have been very poorly executed, even considering the fact that much of it was pioneering work in a relatively little-known field.

There has been published no real revision of the tribe or any important part thereof, although M. R. Smith's 1931 paper and several of his smaller subsequent ones did provide competent reviews of limited groups of species from the New World fauna, complete with figures and keys and based on actual material. The Wessons extended this conspectus for the North American species in 1939. Other published keys have either been based in large part upon original descriptions (often worse than worthless for purposes of identification) or else cover so few species that they are not very useful to the prospective reviser.

CODIOMYRMEX Wheeler

Codiomyrmex Wheeler, 1916, Bull. Mus. Comp. Zool. Harvard 60:326-327. *Strumigenys* (*Codiomyrmex*) Emery, 1922, Gen. Ins. Fasc. 174:325. *Codiomyrmex* Brown, 1948, Trans. Amer. Ent. Soc. 74:114-115.

Worker: Size small. Resembles *Smithistruma*, but the head relatively shorter, thicker and broader, in this respect resembling more closely the species

Glamyromyrmex and *Borgmeierita*. Antenna short and rather thick, the proportions as in *Glamyromyrmex*. Mandibles robust, broad and dorsally convex; basal lamella present, apical series of teeth strong and acute, reduced in number in one of the species. Essentially, the mandibular structure is as in *Glamyromyrmex*. Ventrolateral borders of head terminating anteroventrally in a small tooth on each side, just behind the mandibular insertions, just as in some *Glamyromyrmex* species. Cephalic dorsum densely and rather coarsely punctate or rugulosopunctate, remainder of body with sculpture largely effaced, smooth and shining. Pilosity distinct, abundant to very abundant, consisting of fine tapered hairs, long to moderately long, not reduced or appressed over most of body, and widely distributed. Color blackish- or dark reddish-brown.

Genotype: *Codiomyrmex thaxteri* Wheeler (monobasic).

As here considered, the genus contains only the two rare forms *thaxteri* and *loveridgei* new species. While these forms may ultimately be considered as representative of separate genera, the abundant details of structural agreement presently indicate that generic separation would be entirely premature. Whether or not they are generically distinct, it appears quite clear that these two species are very closely related; in view of their known distributions, this relationship is all the more strange. *Thaxteri* is known only from Trinidad, while *loveridgei* has been taken only on the high Nyika Plateau in British East Africa. Although it is entirely probable that more species related to *Codiomyrmex* will be collected in the next few decades, the chances are that these and other species of the group of genera related to *Glamyromyrmex* will all prove to be relict species of very distinctive character, isolated remnants of a diverse older fauna. Nothing is known of the habits, but it is assumed that the two present species lead a cryptobiotic existence in the soil or soil cover as predators of some small arthropods.

CODIOMYRMEX THAXTERI Wheeler

Codiomyrmex thaxteri Wheeler, 1916, Bull. Mus. Comp. Zool. Harvard 60:326-327, fig. 1, worker. *Strumigenys* (*Codiomyrmex*) *thaxteri* Emery, 1922, Gen. Ins. Fasc. 174:325. *Codiomyrmex thaxteri* Weber, 1934, Revista de Ent. 4:52. Brown, 1948, Trans. Amer. Ent. Soc. 74:115.

Worker: Wheeler's characterization and figure seem to be quite satisfactory, except for his statement of length, "nearly 2 mm." On remeasurement, the workers in the type series [MCZ cat. no. 9122; USNM] all proved to be well over 2.50 mm. in total length. An "average specimen" from the cotype series: TL 2.79, HL 0.65, WL 0.66, CI 86, MI 18; two other specimens from the same series scarcely differed by perceptible degree. Dentition of mandibles not ascertained by dissection, but appearing similar to that normal in *Smithistruma*; basal lamella and about 12 teeth present in the apical series. Color of cotypes at present deep ferruginous; gaster mahogany; legs and antennae lighter and more yellowish.

Type locality: Port of Spain, Trinidad, B. W. I. (R. Thaxter).

Codiomyrmex loveridgei new species

Holotype worker: TL 2.22, HL 0.53, WL 0.52, CI 73, MI 23. Clypeus 0.21 mm. wide. Considerably smaller than *thaxteri*, and with a narrower head and slightly less broad mandibles. Head seen from a directly dorsal position with straight posterior occipital border; lateral occipital borders rather weakly laterally expanded, gently rounded, anteriorly converging in such a way as to be very nearly continuous with the converging preocular laminae in outline. Dorsolateral borders of the head (frontal carinae) not

broadly expanded and convex over the antennal scrobes as in *thaxteri*, but the scrobes rather deep and well-marked in any case. Eyes very small, situated on the ventral scrobe borders a little behind the cephalic midlength. Clypeus triangular, slightly broader than long, anterior border broadly and feebly convex, lateral angles narrowly rounded; discal surface very gently convex in both directions. Ventral border of scrobe cariniform, ending anteroventrally in a small tooth just behind and below the mandibular insertions; in this respect similar to *thaxteri* and some species of *Glomyromyrmex*.

Antennal scape about 0.24 mm. long, of typical *Codiomyrmex*-*Glomyromyrmex* form, short, stout, basally gradually narrowed and extremely feebly sigmoidally curved. Funiculus 0.40 mm. long, the apical segment rather thick and occupying just about exactly half of the funicular length; segment IV broad, longer than II + III; I more slender, but subequal to IV in length; II about as broad as long; III slightly broader than long.

Mandibles thick, broad, somewhat arched and very convex dorsally, lateral margins gently curved. Apical border seen edge on (the mandibles are partly open) forming a nearly complete and perfect semicircle. Basal lamella large, erect, translucent, triangular in shape, slightly longer than wide at base, the apex narrowly rounded. The lamella is only partly covered by the clypeus when the mandibles are fully closed. Teeth of apical series 8 in number, following the basal lamella directly, without a diastema; the teeth all stout and acute, no. 1 small, 2 larger, 3 the largest by a slight amount, 4 and 5 successively shorter, 6 and 7 small, preapical in position, their bases fused together and with the base of the apical tooth, which is approximately equal to them in size.

Alitrunk much as in Nearctic *Smithistruma* spp.; pronotum not broad, but relatively long, its lateral plates taking up nearly half the length of the sides; humeri rounded. Pronotum with marginate anterior border; dorsum sloping and gently convex in both directions and feebly submarginate on the sides posteriorly, the highest point of the convexity seen from lateral view reached at the very feebly indicated line of the promesonotal suture, posterior to which the dorsal profile of the mesonotum and propodeum together form a straight, uninterrupted outline to the bases of the propodeal teeth. Mesonotum not distinctly marginate, sides converging behind. Metanotal groove very feeble; propodeal dorsum very short, much broader than long, dropping off quickly through a rounded angle into the declivity; dorsolateral propodeal carinae produced posteriorly as the bases, rectangular in lateral view, of the small, weakly acute, lamelliform propodeal teeth; the latter weakly elevated and continued ventrally as thin, narrow, feebly concave infradental lamellae.

Petiolar peduncle slender, subconical, slightly longer than the anteroposteriorly compressed node; the node more than twice as broad as long seen from above and with a narrowly rounded summit as seen from the side. Posterior collar and posterolateral lobes of spongiform tissue reduced to fine, thin transparent vestiges; median ventral strip well developed. Postpetiole transversely elliptical, 0.24 mm. wide, more than half again as broad as the petiolar node and nearly twice as broad as its own length; dorsal surface strongly convex, nearly as high as the petiolar node; posterolateral and ventral spongiform appendages well developed. Gaster more convex ventrally than dorsally, with a small anteroventral pad and a broad anterior margin of spongy lamellar material, the latter broadly emarginate in the middle. Gastric costulae numerous, fine but distinct, extending 1/3 or a little more the length of gastric tergite I and showing a slight tendency toward bilateralization, but not separated by a median gap.

Gaster (except for costulae), pronotum, entire sides of alitrunk, and pedicellar nodes smooth or very nearly so, strongly shining. Head, except clypeus, densely and rather deeply punctulate, the tendency toward rugulosity less marked than in *thaxteri*. Bottoms of some of the punctulae shining as minute brilliant points, but the surface generally opaque. Clypeus feebly and very superficially longitudinally punctured, but the general effect one of a fairly smooth and rather strongly shining surface. Dorsal surface of mesonotum and sides of petiolar peduncle densely and distinctly punctulate, opaque to subopaque. Propodeum feebly coriaceous, shining. Legs, mandibles and antennae densely, feebly and minutely punctulate-granulose, weakly shining.

Ground pilosity of head consisting of a moderately dense cover of fine, moderately long, tapered hairs, subappressed and recumbent, directed anteriorly, many feebly arched. A similar, but much more scanty cover on the alitrunk, most of the hairs appressed or subappressed and directed mesially. A very few fine appressed hairs, directed posteriorly, on the dorsal surfaces of postpetiole and gaster. Ventral surfaces of head and gaster also

with fine appressed pilosity. Clypeus set with very small, fine appressed subspatulate hairs, directed anteriorly; no hairs forming a prominent projecting fringe along free clypeal border. Mandibles, antennae and legs with fine, short, appressed and subappressed hairs, directed toward the apices of the various members. Long, fine, specialized outstanding hairs, bilaterally paired: one hair on each occipital corner; one on each lateral occipital border, arched anteriorly; one on each humerus, directed laterally; one on each side of mesonotum, directed anterolaterally; pairs on each node, arched posteriad; sparse growth of very fine but truncate erect hairs on gastric dorsum, becoming more abundant toward apex both dorsally and ventrally. Pilosity in general decidedly shorter, less abundant and less conspicuous than that of *thaxteri*.

Color castaneous; head darker, blackish-brown except for clypeus and mandibles, which are ferrugineous; gaster a trifle lighter than the alitrunk; legs and antennae sordid ferrugineous yellow.

Holotype worker a unique [MCZ] found dead in a small snail shell collected at 5000 feet on the east side of the Nyika Plateau, above Nchenachena, Northern Nyasaland, by Mr. Arthur Loveridge of the Museum of Comparative Zoology. The shell, when first examined by Dr. J. C. Bequaert in the Museum, was seen to contain dried earth and the damaged body of a small black tetramoriine ant, probably *Xiphomyrmex*. Upon carelessly crushing the shell with my finger, I noticed the present specimen in the deeper recesses of the shell. Minute examination of the shell fragments revealed no further insect remains.

Mr. Loveridge informs me that the Nyika Plateau, which is on the western side of Lake Nyasa, has a cool, wet climate of a type inhospitable to human enterprise. The Plateau was formerly heavily timbered, but such forest as now remains in the area of this collection is mostly restricted to the ravines. This is the first species of the *Codiomyrmex-Glomyrmex* group of genera to be found outside the New World tropics. It is apparently a remnant of a once widespread fauna now reduced to a few rare species inhabiting limited refugia. Because of the great discontinuity in the distribution, I was at first reluctant to assign this species to *Codiomyrmex*. After long and thorough comparison with the types of *C. thaxteri*, however, I am forced to the conclusion that the two species are so closely allied that little would be gained by separating them into different genera. Since Thaxter took the types of *thaxteri* in sweepings at Port of Spain, we must consider the possibility that the latter species, like other ants occurring in the same vicinity, may be an accidental importation via human commerce, perhaps originating on African shores.

Codiomyrmex loveridgei can be separated from other short-mandibulate African genera by means of its broad and very convex mandibles with their reduced number of serial teeth (8). The sculpture, pilosity, and very dark color are also distinctive.

Borgmeierita new genus

Codiomyrmex sensu Weber, 1934, Revista de Ent. 4:51-52, part. Brown, 1948, Trans. Amer. Ent. Soc. 74:114-115, part. (Not Wheeler, 1916).

Worker: Size small. Related to *Codiomyrmex* and *Glomyrmex*, but differing in lacking the small ventral premandibular teeth; in having strong, spaced, predominantly longitudinal costulate sculpture; and in the shape of the postpetiole, which is broad and exaggerated-reniform or C-shaped, its blunt anterolateral arms embracing the posterior part of the petiole. Pilosity fine, sparse. Color rather dark.

Genotype: *Codiomyrmex excisus* Weber (by present designation, monobasic).

BORGMEIERITA EXCISA (Weber)

Codiomyrmex excisus Weber, 1934, Revista de Ent. 4:51-52, fig. 9, worker. *Codiomyrmex excisus* Brown, 1948, Trans. Amer. Ent. Soc. 74:115.

Holotype Worker: (Remounted dry on conventional points and remeasured) TL 2.30, HL 0.55, WL 0.57, CI 84, MI 18. For the original description, the unique type was placed by its original author in a balsam mount-between two cover slips, where it rested in a laterally tilted position. Since I could not find agreement in some views

between Weber's characterization and figure and the specimen itself, the mount was dissolved and the major parts mounted on three separate points; the parts were separated in the balsam. An antennal funiculus, legs and smaller mouthparts were remounted in damar on a conventional slide, and the slide and pin given the same type catalog number [MCZ no. 22444] and placed in the same tray.

The head as now seen differs considerably from Weber's figure, especially since the posterior median portion of the occiput was transparent and entirely invisible in the balsam when viewed from the position as indicated by the figure. What Weber shows as the deep, rounded portion of the occipital excision is actually the heavy ventral border of the occipital foramen; in the balsam, this border of the foramen was very distinctly visible through the highly transparent cephalic dorsum. If one draws a straight line transversely across the occipital excision as shown in Weber's figure at about the middle of its depth, the resulting occipital outline is approximately as in the specimen presently seen from a directly dorsal position. The excision, therefore, is only about half as deep as shown in the figure, and has a nearly straight, transverse bottom; the occipital lobes, while still projecting posteriorly and with narrowly rounded apices, are much less prominent seen in this mount. The clypeus is broadly subpentagonal, about $1\frac{1}{4}$ times as broad as long; anterior border very broadly and weakly concave; surface of clypeal disc feebly convex in the middle. Mandibles robust and arched, strongly convex dorsally, much as in *Glomyromyrmex* and *Codiomyrmex* species, with a large, partly exposed basal lamella, no diastema, 7 stout acute teeth in the principal apical series, increasing gradually in length to nos. 5 and 6; 7 shorter, followed by a very short preapical series of a few denticles and a small apical tooth. Masticatory borders of opposite mandibles meet along the midline; the oblique line of closure in Weber's figure is due to tilting and distortion of the specimen in the balsam. Underside of head a short distance behind the oral region with a very deep, narrow transverse fossa. Antennal scrobes deep and broad, overhung by the dorsal borders; eyes small, placed on the dorsal side of the ventral scrobe borders at about the midlength of the head. Antennae short and thick, much as in *Codiomyrmex*, etc.

Alitrunk as described by Weber, with low, obtuse humeral angles; propodeal teeth broken, but described by Weber, evidently before immersion in the balsam, as rather long and acute. Anterior propodeal margin marked by a transverse carinula. Petiole with a distinct node, the summit somewhat flattened and very slightly longer than broad, without spongiform appendages. Postpetiole very distinctive, narrow transverse-subreniform or C-shaped, with the concavity anterior, receiving the posterior part of the petiolar node. Spongiform appendages limited to thin plates on the posterolateral margins, opposing similar masses on the anterolateral gastric borders. Ventral appendages vestigial.

Body in general smooth or nearly so, shining, with rather coarse, well separated longitudinal costulae on the head posterior to clypeus and on the dorsum of the thorax (none on propodeum). On the occiput, the slightly irregular longitudinal costulae are sparsely connected by a few transverse spurs or branch costulae. Petiolar node irregularly rugulose, subopaque.

The pilosity is now completely gone, but Weber says of its former state: "Hairs of body long and fine, sparsely distributed; no squamiform or clavate hairs. Pubescence fine and appressed."

Color deep reddish brown; appendages lighter and more yellowish.

Type locality: Tuli Creek, near San Miguel, Nicaragua (C. R. Halter). Taken from the stomach of a toad, *Dendrobates tinctorius*, found on the forest floor.

WEBERISTRUMA Brown

Smithistruma (*Weberistruma*) Brown, 1948, Trans. Amer. Ent. Soc. 74:106-107. *Strumigenys* of authors, part. (not Fred. Smith). *Strumigenys* (*Cephaloxys*) of authors, part. (not Fred. Smith)). *Smithistruma* (*Smithistruma*) Brown, 1948, Trans. Amer. Ent. Soc. 74:105, part. *Weberistruma* Brown, 1949, Mushi 20:7-9, see also pp. 6, 22, 25.

Genotype: *Strumigenys* (*Cephaloxys*) *leptothrix* Wheeler (monobasic).

Worker: Related to *Smithistruma*, but averaging larger, with more elongate body and relatively longer, more slender legs. Head in dorsal view elongate, cuneiform, resembling in habitus the species of the *clypeata* group of

Smithistruma, but with decidedly broader, more convex mandibles. The convex dorsal mandibular surfaces appear slightly bulging at the base, especially in comparison to the rounded free clypeal border; the latter rather low. Eyes placed ventrally in the antennal scrobes and distinctly behind the midlength of the head. Occipital lobes feebly or not expanded posteriorly and only weakly so laterally; posterior occipital excision feeble to moderate. Antennal scapes relatively longer and more slender than in *Smithistruma*; funiculus only moderately incrassate, the apical segment slightly shorter, or at least not longer, than the four basal segments taken together. Petiolar node, at least in the species seen for this work, low, elongate, and only very weakly differentiated from its peduncle. Propodeal teeth well developed and acute, infradental lamellae variable, but the ventral angles in some cases produced as acute teeth.

The characters of sculpture cited by me as of generic significance in former descriptions must be abandoned due to differences encountered in forms newly placed in the genus. The sculpture varies widely, showing much the same range of variation among species as in *Smithistruma*.

Pilosity also more variable than formerly supposed; ground pilosity of anterior cephalic dorsum consisting usually of small and rather inconspicuous appressed or subappressed hairs; clypeal hairs small and appressed, usually more densely crowded along the free border, especially in the anteromedian region, but not forming a conspicuous fringe as in the majority of *Smithistruma* species. Posterior cephalic dorsum and alitrunk with rather numerous slender erect hairs, truncate or weakly clavate at their apices. A sparse growth of erect hairs also on nodes and gaster.

Color varying widely with the species, running through all shades of ferrugineosity.

Female: Known for only one species. Differs from the worker in the usual ways. Male unknown.

At the time of my original description of *Weberistruma*, I was acquainted with only the genotype as a possible candidate for inclusion. By 1949, I had seen *jacobsoni*, and this species was added. Since that publication, I have been able to examine specimens of *rudinodis* Stårcke and have had Yano's figure of *Strumigenys japonica*, which figure I had previously overlooked, called to my attention by Dr. Kikumaru Okano. I am positive that *rudinodis* is a *Weberistruma*, although an aberrant one, and I am reasonably certain that the ant figured by Yano must also be placed in this genus. The diversity of these species, while making necessary certain changes in the generic definition, strengthens rather than weakens the conception of *Weberistruma* as a separate genus, for it is now possible to detect the basic underlying differences from the related *Smithistruma* and to discard the more superficial characters as variable with the species.

It may be noted that *Weberistruma* does not differ startlingly from *Smithistruma* by very many details, but these details are all-important as generic characters and seem, from the present knowledge of the two groups, to apply with considerable constancy. Beyond these characters, however, there is a certain subtle but none the less sensible difference in the "balance" or habitus of the species of the two genera that can be appreciated only in the examination of actual specimens.

From our present knowledge, the range of *Weberistruma* lies entirely within the Indomalayan region, with a northward extension to Hondo. Although no species are yet known from the mainland of Asia, it appears probable that the genus will eventually be found in warm temperate China and in the more tropical parts of Southeast Asia. Other species almost certainly occur in the Philippines and Borneo; it is only a matter of a wait for their discovery. The distribution appears to be more or less discontinuous, no two species having yet been taken on the same island.

Phylogenetically, *Weberistruma* appears to be intermediate between *Smithistruma* and *Codiomyrmex*. The mandibles outwardly are very similar to those of *Codiomyrmex thaxteri*, and though no dissection has been made for any species, there is no reason to believe that the dentition is very different from that of either related genus. Nothing is known of the feeding habits, but the known nesting sites, especially of *jacobsoni* in a fungus, suggest that the prey may be the same as for *Smithistruma*.

The species *leptothrix* (Wheeler) from Formosa and *jacobsoni* (Menozi) from Sumatra have been discussed in detail in Part I of this revision (1949). The two other species are treated briefly below.

WEBERISTRUMA RUDINODIS (Stärcke)

Strumigenys (Cephaloxys) inezae var. *rudinodis* Stärcke, 1941, Tijdschr. v. Ent. 74, Verslag, pp. ii-vi, worker, morphology, biology, etc.

Worker: TL 3.04-3.12, HL 0.72-0.74, WL 0.81-0.84, CI 68-70, MI 17-18). (Measurements and description based on four paratypes sent by Dr. Stärcke.)

This species is large, slender and quite long-legged for a smithistrumiform ant. Head form much as in other *Weberistruma* species. Antennal scape as normally exposed about 0.41 mm. long in an "average" specimen, slightly thickened in apical half, faintly sigmoidal. Funiculus in same specimen about 0.63 mm. long; apical segment slightly shorter than I-IV taken together; IV slightly longer than I; I subequal in length to II + III; II and III both slightly longer than broad (cf. original description).

Promesonotum markedly depressed, only weakly convex, but not greatly broadened and with only the finest of dorsolateral carinae forming distinct but feeble margins on each side posteriorly at the level of the mesonotum. Pronotum narrowly rounded anteriorly, without humeral angles; no margin separating pronotal dorsum from dorsum of "neck." Posterior mesonotum forming a laterally marginate concavity ending at the very feeble metanotal groove, the latter distinct at all only because the propodeal dorsum rises very slightly but rather abruptly from it posteriorly. Propodeal dorsum flat, its sides submarginate, diverging posteriorly and continued as the long, sharp, somewhat depressed propodeal teeth. These teeth are as long as or slightly longer than the distance between the centers of their bases and are slightly elevated and diverging posteriorly. Infradental lamellae reduced to low, even carinae, each of which has developed at its ventral extremity a prominent, acute tooth, inclined dorsad and about half as long as the dorsal tooth. Lateral aperture of transsternal groove (above and behind anterior coxa) rather conspicuous, the fine hairs evident; suture running dorsad from it rather fine.

Petiolear node extremely poorly defined, its dorsal surface continuous with and a little longer than its peduncular dorsum. Node seen from above subovate, narrowed anteriorly, not more than $\frac{3}{4}$ as broad behind as long (cf. original description). Posterior spongiform collar only weakly developed, narrow; midventral strip well developed, areolate, the anterior part forming a deep rounded hanging lobe. Postpetiole depressed-subglobose, but distinctly broader than long; shorter, and about $\frac{1}{3}$ broader than the petiolear node; a feeble longitudinal costula traversing the length of the dorsal face on each side, other costulae feebly suggested. Spongiform appendages only moderately well developed except ventrally, where much-areolated hanging lobes are fairly heavy. Gaster long-oval, pointed at apex, feebly depressed dorsally, very slightly wider than the head; transverse anterodorsal border and anteroventral pad of spongiform tissue moderately

developed; basal costulae subvestigial, very short and few, not more than 10 in my specimens; gastric surface smooth and shining.

Entire head, including clypeus, entire alitrunk, legs and both nodes densely punctulate-granulose and opaque.

Ground pilosity on the anterior $\frac{3}{4}$ of cephalic dorsum composed of short, fine, inconspicuous appressed hairs, directed anteromedially for the most part. Clypeus and mandibles with similar hairs, narrowly spatulate, more densely arranged and a little more conspicuous, but not longer; closely appressed; those in the center of the clypeus anteriorly most densely packed, oblique, and forming a sort of blunt anteromedian peak to the anterior free clypeal border; however, this illusion disappears under benzene, when the actual clypeal border at this limited median point appears truncate or feebly submarginate. Hairs on scapes short, fine, subappressed, directed apicad. Hairs of underside of head, tibiae and tarsi also fine, reclinate, directed distally.

Erect pilosity consisting of long whitish hairs, stiff but weak, not apically enlarged, but more or less distinctly truncate apically, averaging 0.12-0.15 mm. in length, a bit shorter on the head than on alitrunk, distributed as follows: 25-30 on the posterior third of the cephalic dorsum, weakly curved anteriorly; 20 or so on the dorsum of the alitrunk, mostly restricted to origins near or on the lateral margins; a few on each of the nodes; a sparse growth of perhaps 30 on the gastric dorsum, tending toward arrangement in transverse rows of four. Venter of gaster and surfaces of femora with similar, but slightly shorter hairs, both perpendicularly and obliquely erect.

Color in my specimens bright ferrugineous yellow, but these are evidently teneral, for Stårcke notes in his description that some of his workers are more deeply colored: "De volkomen uitgekleurde werkers zijn roestbruin, met de middelste $\frac{5}{6}$ van het gaster donkerbruin, doch de meeste individuen zijn niet uitgekleurd, van stroogeel tot bruingeel."

Holotype in Stårcke Collection; paratype in Mus. Amsterdam, Mus. Leiden, ZMLB, MCZ, USNM, Weber Coll.

Dr. Stårcke's article contains morphological, biological and other information on this species. His very brief actual description contains some very small measurements, and is mainly comparative against *inezae*. However, he writes me that he has seen no specimens referable to *inezae* or to any of the variants placed infraspecific to it by other authors. While I have not seen specimens of *inezae* myself, circumstantial evidence I have presented elsewhere indicates strongly that *inezae* is a *Smithistruma* of the *capitata* group and an ant very different from the present species of *Weberistruma*. The type locality is Poentjak Pass, near Buitenzorg, Java 1400 M. (E. Jacobson).

WEBERISTRUMA JAPONICA (Ito)

Strumigenys japonica Ito, 1914, Ann. Soc. Ent. Belg. 58:40-41, worker. *Strumigenys* (*Cephaloxys*) *japonica* Emery, 1922, Gen. Ins. Fasc. 174:325 (not Wheeler, 1928). *Strumigenys japonicus* Yano, 1932, in Icon. Insect. Japon., Tokyo, p. 335, fig. 653, worker. *Smithistruma* (*Smithistruma*) *japonica* Brown, 1948, Trans. Amer. Ent. Soc. 74:105, part. 1949, Mushi 20:10, 22.

The original description of this species is virtually worthless. The female assigned to the species by Wheeler in 1928 was separated by me as a new species of *Smithistruma* in 1949 (loc. cit.); in the same paper, I assigned *japonica sensu* Ito to *Smithistruma* provisionally and with doubt. Since that time, Dr. Okano has called to my attention Yano's figure, which I had overlooked in 1949. While this figure and the accompanying description (kindly translated for me by Mr. F. Y. Cheng) add little of specific descriptive value, the figure is sufficiently good that the ant serving as its model is recognizable as a *Weberistruma*.

The question arises at once, however, as to whether the insect figured by Yano is the same as that described by Ito. Yano definitely had not seen Ito's types, the present location of these being unknown, according to an investigation kindly carried out by Dr. Keizō Yasumatsu (in litt.). Nevertheless, I believe that Yano's identification is correct, if only in the correspondence in the two series of large size ("2.5 mm.") and similar locality (Type locality: "Prov. Nagato . . . Hondo; Y. Nawa, collector.") I believe that the measurements will exceed 2.5 millimeters when carefully made, but even if the previously published values are correct, the size is larger than any other known *smithistrumi*-form species from Japan. Certainly no purpose is served, under the circumstances, in

proposing a new name for Yano's specimens. Mr. Cheng's translation of Yano's description is given here with liberal adaptation:

"Body reddish-brown; dorsum of head and basal gastric segment darkened. Clypeus [?], mandibles and legs sordid yellowish-brown. Anterior part of head and scapes with dense yellowish-white squamose [!] pilosity. Prothorax with short [erect?] yellowish hairs, becoming very long on petiole, postpetiole and gaster. Petiole long, its peduncle slender; postpetiole short; both with ventral spongiform appendages. Head long and slender, anteriorly produced; posterior part wider; occipital border concave in the middle. Compound eyes small, situated behind midlength of head. Funiculus with 5 segments, apical longest and broadest. Mandibles broad, inner borders multidentate. Body length about 2.5 mm. Native to Hondo, under stones."

Dr. Okano writes that he has some of Yano's specimens, which he plans to redescribe at an early date.

STRUMIGENYS Fred. Smith

This genus, the largest in the Dacetini, will be treated fully at a later date. I shall discuss here only the species *S. louisianae*, which enters the southern Nearctic Region as the sole representative of the genus there.

STRUMIGENYS (STRUMIGENYS) LOUISIANAE Roger

Text-figs. 1, 3

Strumigenys louisianae Roger, 1863, Berl. Ent. Zeitschr. 7:211, worker. *Strumigenys louisianae* Emery, 1895, Zool. Jahrb. Syst. 8:327 (syn. *unispinulosa*). Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24:145, 147. Menozzi, 1927, Ent. Mitt. 16:268. *Strumigenys unispinulosa* Emery, 1890, Bull. Soc. Ent. Ital. 22:67, Pl. 7, fig. 5, worker. 1892 (?) An. Mus. Nac. Costa Rica, 1888-1889, p. 58, Pl. 1, fig. 12, worker. Wheeler and Mann, 1914, Bull. Amer. Mus. Nat. Hist. 33:40. *Strumigenys unispinulosa* var. *longicornis*, Emery, 1894, Bull. Soc. Ent. Ital. 26:214, worker. 1922, Gen. Ins. Fasc. 174:322, as *S. (s. str.) louisianae* var. (new syn., with doubt). *Strumigenys louisianae* var. *obscuriventris* Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24:145, Pl. 12, fig. 14, worker. Santschi, 1931, Revista de Ent. 1:275, Cuban rec. Weber, 1934, Revista de Ent. 4:39, as subsp. M. R. Smith, 1936, Jour. Agr. Univ. P. Rico 20:857, fig. 13, worker. (new syn.) *Strumigenys bruchi* Forel, 1912, Mem. Soc. Ent. Belg. 29:197-198, worker, male (new syn.) *Strumigenys infidelis* Santschi, 1919, An. Soc. Cient. Argent. 87:48, worker. (new syn.) *Strumigenys eggersi* var. *cubaensis* Mann, 1920, Bull. Amer. Mus. Nat. Hist. 42:430, worker. (new syn.) *Strumigenys (s. str.) louisianae* subsp. *laticephala* M. R. Smith, 1931, Ann. Ent. Soc. Amer. 24:690-691, Pl. 1, fig. 2, worker. Haug, 1932, Ann. Ent. Soc. Amer. 25:170-172, figs. 1, 2, male. Creighton, 1937, Psyche 44:97-109, fig. 1, biology. M. R. Smith, 1947, Amer. Midl. Nat. 37:585, Pl. 14, fig. 53. (new syn.) *Strumigenys (s. str.) louisianae* subsp. *soledadensis* Weber, 1934, Revista de Ent. 4:38-39, worker, female. (new syn.) *Strumigenys (s. str.) louisianae* subsp. *guatemalensis* Weber, 1934, Revista de Ent. 4:39, worker. (new syn.) *Strumigenys (s. str.) louisianae* subsp. *costaricensis* Weber, 1934, Revista de Ent. 4:39, worker. (new syn.) *Strumigenys (s. str.) louisianae* Emery, 1922, Gen. Ins. Fasc. 174:322. M. R. Smith, 1931, Ann. Ent. Soc. Amer. 24:689-690, Pl. 1, fig. 1, worker. Weber, 1934, Revista de Ent. 4:36, 38, worker. (In the above synonymy are included only those citations that add to the knowledge of the species, or make some taxonomic change, or are interesting and pertinent for other reasons. Several references giving mere records within the known range are not listed.)

The new synonymy recorded above will seem incredible to a myrmecologist used to handling the various names included. Nevertheless, I have seen types of all forms mentioned except *louisianae* itself, var. *longicornis*, and the species Emery himself synonymized early, *S. unispinulosa*. These appear to me to be undoubted specimens of *louisianae*; I have little doubt about the "typical" form, since I am quite sure that it is the only form presently recorded from within the United States. The forms described by Wheeler, Santschi and Forel may be put down to the carelessness of these authors in failing to check their types against the species that already had fallen into synonymy. The types of these forms do not differ in any way from specimens that can be selected from North Carolina series.

Mann's *cubaensis* was accidentally put into the wrong species, and has therefore gone

undetected; it antedates Weber's *soledadensis* and has the same type locality. The types do not differ from specimens from any localities in the United States. The form *laticephala* is in actuality the commonly-encountered "normal" form of *louisianae*; what Smith thought to be the "typical" form is less common, but can be found over the same range as *laticephala*. The narrow- and broad-headed forms are frequently found in the same nest, though usually one nest will show relative restriction of the range of variation of the cephalic index. Nests ranging from one end of the scale of cephalic indices to the other without discontinuity may be found anywhere within the range of the species in the United States. The theory of Creighton that the "typical" *louisianae* is more southern in range than *laticephala* will not hold from the series presently available to me.

In 1934, Weber made a serious attempt to put the variants of this species on a basis of geographical variation. First he measured seven specimens from Texas and Florida, determining with a fair degree of accuracy the length of the head including mandibles, length of funiculi, and proportion of length of mandibles to length of head proper. He then made similar measurements on small series of workers ("6 to 8 specimens") from various other localities. On the basis of his findings, and ignoring species described from some of the same areas previously, he set up his new subspecies and "confirmed" Wheeler's *obscuriventris*. All this was done on the basis of very small "average" differences between the values for the various series; neither range of measurements nor error of measurement were cited. I have repeated the measurements of Weber, not only upon the same specimens he used as types, but also upon 110 workers from various North American collections (Tennessee, North Carolina, Alabama, Georgia, Florida, Mississippi, Louisiana, Texas), plus about 60 specimens representing the Neotropical localities from which material is listed below. The North American specimens will cover in degree of variation, matching exactly in any quantitative character, any of Weber's specimens that may be chosen, providing the normal error of measurement is taken into account. Some of the South American specimens are a bit outside this range of variation, especially some of those from Argentina and Bolivia; this is to be expected, for some part of South America, not North America, is surely the center of distribution. Specimens of this ant from northern Argentina, however, will match perfectly many from the North American series.

In sum, *louisianae* is a variable ant, ranging from northeastern Tennessee to northern Argentina and Bolivia. It is not so variable, however, as might account for the relatively large number of synonyms, a number that can be put down only to carelessness on the part of several authors who do not seem to have bothered to check the literature or their own collections very far. The variation is greatest in South and Central America, and is apparently restricted by the relatively rigorous selectivity of the climate in North America. Though the type locality is Louisiana, I cannot see that this affects the synonymy in any way. If specimens from nests in Argentina cannot be differentiated from those in Louisiana, as in my finding, then we are dealing with one widespread species.

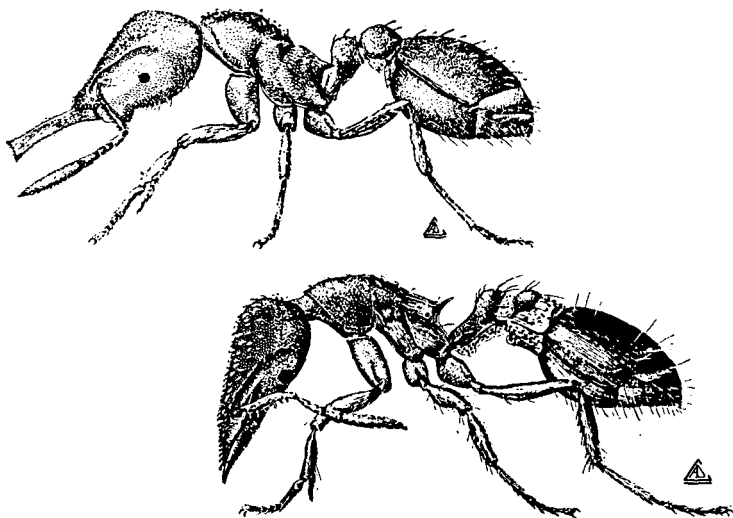
Results of statistical treatment of the various population samples showed lack of significant apportionment of any character that could be put into quantitative terms, except possibly in the case of the Bolivian sample, which showed very short heads, but in which the mandibles were not significantly shorter in absolute terms than were those of other regions. These specimens have, therefore, a relatively high mandibular index and relatively long antennal scapes compared to the head proper, and this fits Emery's characterization of *longicornis*. I am considering the variety *longicornis* as a synonym, however, because I feel that the difference is too slight to be really significant and because the material is representative of only one colony-series. Since no collection of *louisianae* have yet been made in the Amazon Basin or other parts of Brazil, where the species must be present and very variable in at least some areas, I believe that the present estimate of the variability may be low.

The range of some measurements on the combined worker specimens from the North American and other localities is as follows: HL 0.47-0.65, ML 0.26-0.40, CI 79-89, MI 50-63. Undoubtedly, specimens will be found to exceed these ranges slightly in one direction or another, but I doubt if many such specimens will come from North America. So far as is known, the smallest specimens come from Mexico and Argentina, and the largest ones from Argentina. Argentinian specimens intergrade from the largest to the smallest in a perfectly continuous series.

The species has been figured well and described so many times that redescription here would be completely superfluous. For a characterization of the worker, the references of

Smith (1931, 1947) are suggested, while the male has been treated very well by Haug (1932). Weber has described the female adequately under the name *soledadensis* (loc. cit.).

It is felt that the great difficulty experienced by some workers in determining specimens belonging to the *louisianae* group is due largely to the great uncertainty brought about by the excessive unrecognized synonymy. Once the variability and different treatments of the various authors are thoroughly understood, identification should be an easy matter. Practically every worker who would normally be interested in this form will find that he has specimens in his collection, for this is a very commonly collected ant in the warmer parts of the New World. There are, however, a number of undescribed species closely related to *louisianae*, but distinct by what I consider to be significant characters. These will be described at an early date, in the general treatment of the Tropical American *Strumigenys* I have nearly completed in manuscript.



Text figs. 1, 2.—1. (above) *Strumigenys louisianae* Roger, worker, lateral view (after M. R. Smith); 2. (below) *Smithistruma rostrata* (Emery), worker, lateral view. Specialized erect hairs of occiput, humeri, and mesonotum not shown (after M. R. Smith).

The worker type of *louisianae* is apparently in the Roger Collection, ZMUB. Types of *unispinulosa* and *longicornis*, Emery Coll.; *infidelis*, Santschi Coll., MCZ, Borgmeier Coll.; *cubaensis*, Mann Coll., MCZ; *obscuriventris*, AMNH, MCZ; *bruchii*, Forel Coll., MCZ; *laticephala*, USNM, MCZ, etc.; *soledadensis*, *costaricensis*, *guatemalensis*, MCZ.

Type locality: "Louisiana" (J. Roger).

MATERIAL EXAMINED

UNITED STATES: Abundant material representing over 50 colonies from various localities in North Carolina (D. L. Wray); Tennessee (L. G. Wesson, D. W. Pfitzer, J. W. Jones); Georgia (H. Hoogstraal, J. C. Bradley); Florida (A. Van Pelt, P. J. Schmitt); Alabama (E. O. Wilson, B. D. Valentine, W. S. Creighton); Mississippi (M. R. Smith and others); Louisiana (F. G. Werner, H. S. Dybas, C. L. Remington, W. L. Brown); Texas (W. M. Wheeler, C. F. Baker); Arizona, Hot Springs (Schwarz and Barber: Mr. Barber assures me that this specimen, which I have not seen, but which has been determined by Dr. M. R. Smith and is therefore considered perfectly reliable, was taken under conditions that would lead one to believe that the record does not represent a chance introduction into Arizona. If so, this is a rather remarkable locality, for *louisianae* has not been taken in nature at any other point west of central Texas and north

of the Mexican Border, in spite of heavy collecting by myrmecologists and other entomologists in this region.) Many other series seen by the author but not measured are omitted from mention.

MEXICO: Nautla, Vera Cruz; Necaxa, Puebla (F. Bonet). Mexico, D. F.; Banderilla, Vera Cruz (U. S. Plant Quarantine).

GUATEMALA: Zacapa (W. M. Wheeler). Escuintla (W. M. Mann).

COSTA RICA: Colombiana Farm, Santa Clara Prov. (W. M. Mann). San José (H. Schmidt). Cartago (W. M. Wheeler). Hamburg Farm, S. Clara Prov. (F. Nevermann).

CUBA: Soledad, Cienfuegos (W. M. Mann; N. A. Weber). Almenvales (A. Bierig).

HAITI: Diquini; Cape Haitien (W. M. Mann).

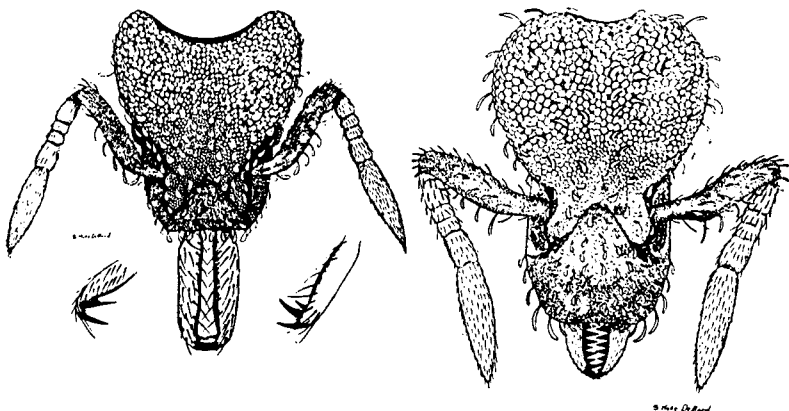
PUERTO RICO: Utuado; Coamo Springs (W. M. Wheeler). Mayagüez (M. R. Smith).

COLOMBIA: Rio Porce, 1020 M., no. 989; Medellin, 1800 M., no. 919 (N. A. Weber). "Colombia" (U. S. Plant Quarantine).

BOLIVIA: Rosario, Lake Rocagua (W. M. Mann).

ARGENTINA: "La Plata" (C. Bruch; the types of both *bruchi* and *infidelis* bear this same vague locality). Reducción, Laguna de Calimayo (N. Kusnezov); Los Puestos (Kusnezov and Golbach).

The total absence of this species in collections of dacetines from Barro Colorado Island, British Guiana and Brazil is rather surprising. Perhaps it is really absent or very rare in the true rain-forest belts.



Text figs. 3, 4.—3. (left) *Strumigenys louisianae* Roger, worker, head in full-face view (after M. R. Smith); 4. (right) *Smithistruma* (s. str.) *rostrata* (Emery), worker, head in full-face view (after M. R. Smith).

SMITHISTRUMA Brown

Smithistruma Brown, 1948, Trans. Amer. Ent. Soc. 74:104 et suiv., part. *Strumigenys* of authors, part., not Fred. Smith 1860. *Cephaloxys* Fred. Smith, 1864, Jour. Proc. Linn. Soc. Lond. Zool. 8:77, nom. praeocc. *Strumigenys* (*Trichoscapa*) of authors, part. not Emery 1869. *Epitritus* Emery, 1875, Ann. Mus. Civ. Stor. Nat. Genova 7:474, part. *Strumigenys* (*Cephaloxys*) of authors, part.

Genotype: *Strumigenys pulchella* Emery (by designation of Brown, 1948).

HISTORICAL

Smithistruma was raised in 1948 to include the majority of "short-mandibulate" species included up to that time in *Strumigenys*. It was demonstrated

there that the species with short mandibles actually represented several distinct stocks that had remained unnoticed in the welter of poorly described and synonymous forms contained in the portmanteau genus *Strumigenys* as treated in Emery's contribution to the *Genera Insectorum* (1922). Emery and others had vaguely recognized only that the old, heterogeneous *Strumigenys* could be divided into two groups, the nominate subgenus and *Cephaloxys*, based on length and other characteristics of the mandibles. In 1943, M. R. Smith showed that *Cephaloxys* was preoccupied and applied Emery's old name *Trichoscapa*, which had earlier been used in the same sense by Santschi, to the assemblage of short-mandibulate forms.

With regard to the latter group, the heart of my revisionary action in 1948 lay in the recognition that the genotype of *Trichoscapa*, *Strumigenys* (T.) *membranifera* Emery, is not congeneric with the majority of short-mandibulate forms. When *membranifera* and its synonyms were separated from the mass of short-mandibulate forms, the latter were left without an available generic name. This situation was met by the proposal of a new name (*Smithistruma*) applicable to the aforesaid majority. At the same time, the heterogeneity of *Smithistruma* was recognized by its division into four subgenera. Subgeneric standing was resorted to for the division because I did not on that occasion have the knowledge of all the described species required for clean and certain delimitation of genera, but I felt that certain stocks seemed differentiated well enough to warrant nomenclatorial distinction of some kind. After further research into the characters of the more poorly known species of the *Strumigenys* complex, I was able in 1949 to show that two of the subgenera recognized earlier, *Weberistruma* and *Serrastruma*, were in fact separate genera.

At the present writing, few changes are recognized as necessary in the existing generic structure of *Smithistruma*. Bv row, all but three or four species of the *Strumigenys* complex are known well enough for certain placement to genus, and this handful of *species inquirendae* contains no form likely to upset the basic arrangement in the smithistrumiform subcomplex. Of the 56 species here recognized as belonging to *Smithistruma*, 53 fall into the nominate subgenus, two go into *Wessonestruma*, and one is herein made the type of a new subgenus, *Platystruma*. Further subdivision along the lines of the species-groups I have used in this work may well be possible in the future, but at present there seems to be no point worth gaining in delimiting these groups as subgenera. The groups are connected or seemingly connected in all directions by intergradient forms, so that most of the limits here drawn are to be considered artificial conveniences of a temporary sort. Furthermore, the addition of new species to the genus at an increasing rate as the rich tropical areas are explored will inevitably make even the "natural" groupings here suggested obsolete within a decade or two.

The present work may be regarded as the first real revision of the genus in a strict sense. While the species retained the generic and subgeneric names *Strumigenys* (*Cephaloxys*) or *Strumigenys* (*Trichoscapa*), a few works did appear in answer to the need for compilations of regional faunas and for keys. While several of these regional works are carefully done and comprehensive within their stated limits, and thus are valuable in any case, none has included purposefully the changes needed to clarify the status of the genera and species

included in the respective areas. These works have for the most part been constructed as the vehicles for new species and for the statement of important biological information, and little attention has been paid to synonymy, supra-specific grouping, or to the important but tedious task of describing the males and females known and associated with the respective workers.

The majority of the regional reviews have little bearing on the present revision for the reasons stated above, except as they contain new species or new morphological, biological or ecological information. The best and most important of these papers have been written by Emery (1895) and certain North American specialists on the Nearctic fauna; among these most constantly referred to here are M. R. Smith (1931), L. and R. Wesson (1939), and, for morphology, Kennedy and Schramm (1933). Although not all strictly in the nature of regional reviews, the various papers of Emery, 1875, 1890, 1894, 1895, 1905, 1916, 1922) are noteworthy both in that their author brought forth many useful (but since neglected) characters and in the fact that he continually strove by means of figures and annotations to fill the gaps left by the hasty, incomplete work of Forel and Santschi in the knowledge of the species described by the two latter authors from the Mediterranean area and the Americas. Undoubtedly Emery knew more about the higher dacetines than did either of his contemporaries, and had he not been overtaxed in his lonely job of clearing up the messes left by the others in general formicid taxonomy, he might have found the time to seek logical generic arrangement for the dacetines many years ago.

Other than the literature mentioned, the writings on the species now placed in *Smithistruma* are scattered as bits and pieces, mostly in the form of stark specific descriptions with a sprinkling of worthless keys, throughout the myrmecological literature from the 1860's to the present.

The knowledge of the biology of the species really begins with 1936, in which year L. G. Wesson made the definitive observations of *S. pergandei* feeding upon Collembola. Due to further observations by the Wesson brothers (1939) and others (especially E. O. Wilson, in press), this remarkable prey specificity is known to be more or less faithfully followed by several species in different genera of the *Strumigenys* complex, and is therefore thought to be basic to their ethology. Previous to 1936, the opinion had prevailed that the higher dacetines were fungus-feeders (cf. Forel 1893, Kennedy and Schramm 1933), largely due to the mistaken notion that the Dacetini were closely related to the Attini. Aside from feeding habits, however, the literature contains quite a few references, mostly very brief, citing nesting habits and other data concerning ethology and ecology of *Smithistruma* species. The two papers by L. G. Wesson cited above are in this respect also easily the best in the field. It remains for the present paper to extend and generalize upon the observations of the Wessons and to collect and evaluate the great number of individual observations and collecting records, both in the literature and out.

EXTERNAL MORPHOLOGY

Worker: The *Smithistruma* worker is essentially a *Strumigenys* with short, subtriangular mandibles lacking a true apical fork of spiniform teeth. The head is usually a little longer and more depressed than in *Strumigenys*,

with the occipital lobes in general less prominent and expanded, as might be expected from the lesser bulk of the mandibles. The shape of the head may be described as depressed-pyriform, -sagittiform, or -cuneiform, always more or less broadly and deeply excised at the posterior occipital border. As in *Strumigenys*, broad lateral antennal scrobes are present, these occupying the larger part of the sides of the head and usually terminating at or just anterior to the point on each occipital lobe that reaches farthest to the sides. The clypeus is broad and shield-like, usually more strongly developed than in *Strumigenys*, its free border extended as a covering over a considerable portion of the mandibular bases when the mandibles are fully closed. The free clypeal border may have one or two margins and may be broadly rounded, truncate, bluntly pointed, or emarginate to varying degrees. The plane or weakly concave or weakly convex dorsal surface of the clypeus is here called *clypeal disc*. The disc shows a small raised *tumulus* with varying distinctness at or slightly posterior to the center of the free clypeal border; the tumulus is often more or less shining, with thin, transparent integument, and it seems to have some sort of connection to the labral apparatus or its muscles. The posterior portions of the free clypeal border on each side become more or less laminiform at the lateral clypeal angles, where they finally merge more or less completely and indistinguishably with the *preocular laminae*. The latter structures have been known as "ventrolateral borders" or have been described in other ways by former authors, but it should be noted that the laminae are quite distinct from the true ventrolateral borders, which are usually the same as the ventral borders of the antennal scrobes in the anterior region of the head. This point is fairly well illustrated in the lateral view of *S. rostrata*, text-fig. 2, taken from Smith's synopsis of the Nearctic ant genera. Kennedy and Schramm (1933) show the relationships of the various borders very well and in some detail in their figs. 1-8. The preocular laminae become narrower posteriorly, and finally disappear somewhere in the neighborhood of the dorsal side of the eye, the latter organ being situated on the dorsal side of the ventral scrobe border, usually at about the cephalic midlength. The eyes are usually poorly, and never really strongly developed and have 2-9 facets in their greatest diameters. Figs. 5 and 6 of Kennedy and Schramm illustrate very nicely variation occurring in the workers of one nest of *S. dietrichi* with regard to medial or lateral displacement of the eyes; this variation must be considered in the determination of species in any part of the genus.

The mouthparts are quite aberrant and of great interest both taxonomically and morphologically. Those of the Nearctic *S. dietrichi* were studied in considerable detail by Kennedy and Schramm (1933); it is stated in footnote 1, page 95 of their paper that "Kennedy is responsible for the general and morphological notes, also for the illustrations," so that references to statements and illustrations in the paper will be given here under Dr. Kennedy's name. The mandibles are the largest and most conspicuous parts and are of great importance due to variation by species or species-groups in the dentition. While small in comparison to those of most *Strumigenys* species, the mandibles are rather large and prominent in comparison with those of ants of many other tribes; furthermore, their seeming small size is partly due to the fact that in the normal closed position up to one half or even more of the full

length may be concealed beneath the clypeal apron. The mandible freed from the head is seen to be narrowly subtriangular in dorsal view. Several of the figures in Plates I and II (figs. 11, 12, 17, 19, 21, 24) show the mandibles of their respective species in dorsal view, and due to the transparency of the integument, the dorsal and ventral views are much alike. A study of these figures will show that the shaft is a long, thin, hollow shell with a U- or C-shaped cross section along most of its length. Kennedy's figures 8 and 13 show this correctly, although several of his other figures are ambiguous or incorrect in demonstrating this point.

In normal position as attached to the ant, the hollowed-out face of the mandible is directed inward and downward, and the lower of the two mandibular margins is ventral and out of sight when the head is viewed from above; this lower margin may be called *ventral margin*. The upper or *dorsal margin* is divided into two borders, a tooth-bearing *apical border* (inner or masticatory border) and a more or less oblique, concave *basal border*, the two borders meeting through an obtuse angle capped by the *basal lamella*. In practice, it is also convenient to term the lateral profile of the mandibles as seen in dorsal view "lateral margin" or "external border," even though a true border or margin is not present here. The basal lamella varies enormously in shape from species to species, as will be appreciated from the plates. In some of the figures it appears much like just another tooth of the apical series; in others it is seen to be more or less fused with the first few apical teeth. In actual specimens mounted in balsam, however, it is seen to differ from the apical teeth in its thinner texture and in the fact that its proximal border is continuous with the basal border. In quite a few species it is separated from the *apical series* of teeth by a greater or lesser *diastema* (figs. 1-3, 7, 16).

The teeth of the apical series vary with species in shape, relative size and in numbers. The basic number appears to be twelve, and there is no species known to me that has more than twelve. Certain species have lost one, or rarely two or more teeth by reduction or fusion; stages in this lessening of the number of teeth are illustrated by figures 2 (reduction) and 15, 17 (fusion). *S. (Platystruma) depressiceps* seems to have undergone the most radical reduction (fig. 18) by fusion. The apical series is conveniently subdivided according to the size of the teeth into *principal* (basal), *intermediate*, and *preapical* series, and an extreme *apical tooth*. The principal series consists of the large teeth, usually five in number, nearest the base. The intermediate series consists of two teeth, often intermediate in size, but really scarcely differentiable from the principal series; distal to these and just before the apex comes the series of four preapical denticulae, usually very small and the most constant series in size, position and number. The single apical tooth is variable in size and often small, but usually larger than any of the preapical denticulae. Very many specimens have been examined for mandibular characters during the course of this work, but only three cases were noticed of inconsistent dentition among the material; two specimens of *S. clypeata* (of 22 examined) showed a supernumerary denticle as portrayed by the dashed line in fig. 16, and one specimen of *S. ornata* (of 26 examined) as in fig. 2. The various combinations present are beautifully adapted as specific characters and will probably show a great deal concerning phylogeny to future workers with better

collections. Unfortunately, dissection of the mandibles usually means destroying or damaging the specimen, so that in cases where type series were very small and belong to other persons or institutions, I have not risked the proper examination of the dentition.

The labrum is highly modified in all *Smithistruma* and more or less resembles Kennedy's figs. 8 and 9. Kennedy shows the apices of the labral lobes as a bit more acute than they actually are and omits the hairs which spring straight forward from the tips. One of the hairs on each apex is longer than the others, but never nearly so long as the corresponding "trigger hairs" of *Strumigenys*. The labrum consists essentially of a pair of close-set, parallel, elongate cones, basally slightly broadened and with the basal portions attached by a transverse body or partition. In specimens of several species examined under the compound microscope after being placed uncleared in damar, air bubbles were seen to fill the lumen of one or both cones. Pressure on the cover glass caused the bubbles to be squeezed out through what appears to be an apical or subapical orifice on each lobe. Whether or not the orifice was natural or was an artifact in each case could not be certainly determined. If the orifice is natural, there exists the possibility that the labral lobe acts as a nozzle in ejecting some toxic or other substance used in quieting the prey. Another possibility is that the lobes may somehow be used as sucking mouthparts in obtaining food. In many mounts, there appeared to be an orifice, perhaps again an artifact, in the transverse body between the two lobes near their bases. If this is a real and constant feature, one might suppose that a purpose of the lobes would be to act as a guide or track between which liquids could either be ejected or drawn into the mouth cavity. The mouthparts are so small and heavily chitinized that brief attempts on the part of Dr. John Woodland and Dr. William Nutting to investigate the structure by means of serial sections met with no success. The purpose of the very aberrant labral apparatus therefore remains obscure, and the speculation indulged in above is intended only to stimulate further investigation.

The maxillae are shown in Kennedy's figures 7, 8 and 12. These figures are very clear as far as they go, and figure 8 shows nicely how the mouthparts appear closed and in the protective position in which they are found in most specimens killed in alcohol. Unfortunately, Kennedy has overlooked the lacinia, which he definitely states he did not find. In workers of *S. rostrata* (Tennessee), *S. pergandei* (Ohio) and *S. dietrichi* (Tennessee) examined during the course of the present work, the mouthparts of three specimens of each species were mounted in lactic-acetic acid medium and examined under the compound microscope. In all cases the lacinia was clearly present as a sub-quadrate plate of thin, transparent, chitinous-appearing material situated in the usual position. I have checked my slides against the figures presented in the masterly survey of formicid mouthparts by Bugnion (1930), and there is no doubt that the lacinia has been correctly identified. This member corresponds in position to the appendage shown unstippled in Kennedy's fig. 12, and since I can think of no other structure that would occupy the same position in that author's *dietrichi* specimens, it appears that he has drawn in the lacinia in a vague way without realizing what it was. The figure in question shows the proximal border as oblique and representing a torn, or perhaps jagged edge.

In all of my specimens, the medioproximal angle of the lacinia is rounded and the proximal border transverse, the angle bearing the majority of the hairs found on the border of the lacinia concentrated into a small row or brush. I believe that Kennedy mistook this row of hairs for the torn edge of an unidentified membrane.

Otherwise, Kennedy's fig. 12 is clear and accurate, showing the cardo, stipes, epistipes (supporting the lacinia), palp and features of the galea. It may be mentioned that the two longest hairs on the galea are relatively thicker in all three species examined than as shown in Kennedy's figure, and the apices of these heavy hairs are slightly thickened and sharply recurved. The palps are worthy of note, since they are reduced on each maxilla to a single very small, subfusiform segment bearing a slender apical seta. The structure of both labial and maxillary palps is about the same in all the species of the *Strumigenys* complex (including about half of the *Smithistruma* species discussed in this work) in which the mouthparts were readily accessible to examination *in situ*. I have little doubt that this is a constant generic character.

The labium is similar in structure to that of most other ants in possessing submentum, mentum, striated glossa and rastelli; the palps are present as small, stout, single-segmented curved clubs, a little larger than the maxillary palps. Kennedy shows all of these parts faithfully except the rastelli, which are so large and prominent that this omission is unaccountable. The epimental rods are present but small, and though not homologized, are shown in Kennedy's figs. 10 and 11, Z. The raquettes are large and rather shapeless, appearing membranous in my preparations; Kennedy does not show these in his figures.

The antennae, as in other dacetine ants, vary in length with the amount of anterior extension of the mandibles. Accordingly, those of *Smithistruma* are rather short. The funiculus is always longer than the scape; the latter is feebly to strongly incrassate and weakly to very distinctly bent or curved near the base. The funiculus is made up of five segments proportioned as in the majority of *Strumigenys* species, i.e., the apical segment forms a long thick clava slightly to distinctly longer than the four basal segments taken together. Segments II and III, counting from the basal segment, are very small, often transverse, and in the *baudueri* group are indistinctly separated from one another and from the basal segment, giving the distinct impression that fusion is in process. Segment I is slender and cylindrical, but short, usually as long as II + III and equal to or a little longer than IV in length. IV is rather broad and may in a sense also be taken as part of the apical clava; it is usually longer than broad, but in very short-mandibulate species may be slightly broader than long.

The alitrunk (equivalent to the "thorax" of most writers on the ants) is composed as usual of the true thorax immovably fused with the propodeum ("epinotum" of some authors). All the elements of the alitrunk are solidly fused dorsally; sutures here are obsolete or obsolescent in the worker. The promesonotum usually forms a single convexity of greater or lesser degree, the pronotum being the widest part of the alitrunk. The mesonotum is usually considerably narrowed and often depressed toward its posterior extremity; it is limited at the rear by the usually obsolete or very feeble metanotal groove

(called "mesepinotal suture" or various other names by different workers). The propodeum and elements of the metanotum together form a rather narrow box, usually with the sides subparallel and more or less continuing the posterior surfaces of the mesopleurae. The propodeum possesses dorsal ("basal face" of authors) and declivous faces, usually forming a more or less distinct angle where they meet as seen in lateral view. The dorsum is plane or weakly convex, and seen in profile is usually continuous or nearly so with the posterior dorsum of the mesonotum, there usually being little or no interference with the outline by the metanotal groove. Propodeal teeth are always present and distinct, usually acute and more or less compressed, and continued ventrally by infradental lamellae or cariniform lamellar vestiges; both the teeth and the lamellae vary greatly in development, shape, etc. according to the species. The lamellae may be convexly broadened or subangular at their ventral extremities, but they do not form prominent acute teeth here as in some other genera; often the lamellae or carinae will just gradually disappear ventrally. The sides of the alitrunk bear a distinct suture between the lateral plates of the pronotum and the mesopleurae; this suture runs vertically from near the spiracle hidden just under the edge of the lateral pronotal plate down to a small aperture situated just behind the anterior coxae; this aperture is round or oval, and constitutes the lateral opening of a deep transverse groove traversing the sternum; each aperture may be surrounded by a thick growth of very fine short hairs, so that it may have some glandular function in certain species. There is also a more or less distinct furrow separating the meso- and metapleurae for a distance ventrally from the metanotal groove. The spiracle on the metapleural-lateral propodeal face is quite prominent, and the metapleural gland is present in the posterolateral part of the metapleural extension as a more or less translucent swelling with a posterior aperture.

The "neck" forming the actual attachment between the pronotum and head is usually separated from the dorsum of the pronotum by the arcuate, sharp anterior pronotal border, although in some species this border is absent or reduced.

The petiole consists of a cylindrical or subconical peduncle and a distinct node, the latter with a more or less rounded summit and often with a feeble carinula running from the summit down each side of the anterior face onto the peduncular dorsum. Spongiform appendages are usually present (sometimes vestigial) as a posterior transverse dorsal collar with lobes more or less developed from its ends on the sides of the node; the midventral strip may be present and well developed, or in the *schulzi* group, may be completely absent.

The postpetiole is transversely ovate or elliptical, broader than the petiolar node, with a convex dorsal surface. Spongiform appendages are always present, but vary greatly in development from species to species.

The gaster moderate to small in size, ovate, more strongly convex ventrally than dorsally and with a more or less pointed apex. The anterior dorsal border is transverse and usually fitted with a spongiform margin, and an anteroventral pad consisting of a spongiform mass and some fine subreclinate hairs is usually present but more or less covered by the ventral postpetiolar appendages. The spongiform appendages are chiefly or entirely formed of

areolate and vesiculate, finely involuted and subdivided lamellar chitin or whatever material the integument itself is made of. The function of these appendages is at present entirely unknown, although it may be that it has something to do with luring collembolan prey within striking distance through some sort of olfactory principle postulated as being connected with the appendage. Certainly these structures, appearing in over two hundred related species of higher dacetine ants, must have some important function in the economy of the insects.

The sculpture is basically the same as in *Strumigenys*, consisting on the head and alitrunk of crowded, very fine punctulae; each of the punctulae under very high magnification may be seen to possess a small central tubercle bearing a hair or the vestige of a hair. While the punctulae are very greatly reduced in size and enormously multiplied in numbers, the plan of each of the units and the general relationships of one to another are essentially the same as found in lower genera like *Acanthognathus* or *Hexadacton*. The spaces between the punctulae in *Smithistruma* are opaque in general, and in any case are so narrow that little light can be reflected from them. The scapes, legs and petiole are most often also punctured in the same way or more finely so, but usually not so distinctly as is the head. The postpetiole may be smooth and shining or punctulate, while the gaster is most often smooth and shining over the major part of its surface. At the base of the gaster are found a number of *basal costulae* ("striae" of authors) in the nature of fine or coarse, somewhat thread-like structures extending from the spongiform anterodorsal border back over the surface of the basal gastric tergite for varying distances. These appear as anchoring devices for the spongiform border, but this may not be their function.

The sculpture, of course, varies greatly with the species, and practically any portion of the body may have the punctulation wholly or partly effaced and the resulting surface more or less smooth and shining. Also, there may be longitudinal rugulation or striation present in varying degrees of distinctness, especially on the pronotum and postpetiolar disc. The major portion of the head capsule, however, seems always to retain its punctulation in about the same way. The mandibles are usually more or less smooth and shining. The alitrunk usually shows a number of small surface features, such as humeral and lateral mesonotal paired piligerous tubercles, and these are relatively constant in position. Other piligerous tubercles may also appear in pairs. There is quite often a median longitudinal carinula on the promesonotum as in many *Strumigenys* species.

The pilosity of *Smithistruma* is very important in taxonomy, since the species vary widely from one to another in respect to the form and development of the different hair systems. The fact that there exists a basic pattern upon which the hair systems vary does not appear to have been properly recognized; this pattern is apparently the same for *Strumigenys* and *Smithistruma*, and the two genera display perfectly bewildering modifications in parallel development that show that the pattern of genetic control must be very similar throughout.

The hairs may be divided into three "systems" or kinds of pilosity, any one of which may be masked by submergence in another system:

(1) *Ground pilosity.* Pilosity analogous at times, but probably not homologous, to the pubescence of other formicid tribes. The term is here reserved for the relatively short, numerous hairs of the head and alitrunk, usually appressed or subreclinate, and the smaller reclinate hairs of the legs. These hairs are varied in form, and may be filiform, spoon-shaped, spatulate, etc. They are usually more abundant and larger on the head than on the alitrunk, and those of the occipital region tend to be longer and narrower than those on the anterior part of the head. The petiole, postpetiole and gaster rarely bear well-defined ground pilosity.

(2) *Border pilosity.* The free clypeal border and the anterior borders of the antennal scapes usually bear a kind of specialized ground pilosity in the form of a row or fringe of hairs. These are usually larger than the rest of the hairs on the surfaces of clypeus or scapes respectively, and may be curved in various directions.

(3) *Specialized erect hairs.* These hairs, when present, are longer than the ground hairs and more slender and erect. They may be clavate, spatulate, bristle-like or flagelliform; they seem to be distributed in a basic spatial pattern. The basic pattern seems to include two transverse rows of four each on the verticociput, the two most lateral hairs of the anterior row being situated on the sides of the occipital lobes and directed laterally. The median pair of the anterior row is quite often absent in the worker. Each humerus and each side of the mesonotum usually bears one of these hairs, and there may be one or two extra pairs present also on the alitrunk. These usually arise from the piligerous tubercles mentioned above. The petiolar node may bear one or two pairs, directed posteriorly, and the postpetiole 2-4 pairs, also directed to the rear. The gaster bears 2 to 7 more or less irregular transverse rows, usually of 4 hairs each. The anteriormost row may be inclined anteriorly or posteriorly, but the rest are usually inclined posteriorly; the hairs become shorter and finer toward the apex of the gaster. Any of the hairs mentioned in this system may be absent, and sometimes all of them are merged into the ground pilosity; the limits between the two types of hairs are frequently academic.

The range of coloration shown by the genus parallels that of *Strumigenys*. The basic pigmentation appears to be a kind of reddish-brown or orange-brown usually known as "ferrugineous." The differences in color from one individual to another seem to be due to variation in the degree of concentration of this pigment more than to addition of other pigments, even though certain forms may be so dark as to approach blackness. Accordingly, I have usually stated color in terms of degrees of ferrugineosity. Since variation in one species or even in one nest may be considerable, color is not usually considered to be a very significant taxonomic criterion. Nevertheless, it is sometimes of importance as a specific character in known material. Variation known to me in the worker caste ranges from pale ferrugineous yellow to blackish-mahogany; I have never seen a jet-black individual. The majority of species are concolorous or nearly so, although the gaster and sometimes the cephalic dorsum may be slightly infuscated. The legs and other appendages of relatively small mass usually appear lighter than the rest of the body, but this is probably due

more to the translucency of the members than to a lesser concentration of pigment there.

The total length of *Smithistruma* workers I have seen varies from about 1.5 to 2.85 mm. The head varies from a little more than half as broad as long to less than 9/10 as broad as long. The mandibles are usually less than 1/4 the length of the head proper, considering only their normally exposed length, and are most often decidedly shorter than the clypeus. In a few forms, however, the mandibles reach almost 1/3 the head length and are as long as or very slightly longer than the clypeus. The head and alitrunk are usually not very different in length, and quite often are just about equal, though the length of the alitrunk is more variable in any given species than is that of the head. The legs of *Smithistruma* are usually of moderate length, and the whole animal gives an impression of compactness. The tibiae are rather short and incrassate, especially toward their apices. A well developed sting is present in all the species so far as I am aware.

Female: The female differs from the worker in much the same way as in *Strumigenys*. The total length and the widths of head, alitrunk, petiolar node and gaster are usually greater than in the worker, but the difference, while usually constant in one species, is not so great as might be expected from the experience of caste differences in other ant tribes. The eyes, of course, are much larger and more convex, and ocelli are present and well formed, but rather small. The wings are always developed, and consequently the alary sclerites of the thorax are fully differentiated, changing the form of the alitrunk completely from that as seen in the worker. Forms intermediate between worker and female are unknown. The scutum often bears the median carinula seen in the worker, and in addition, the surface may be finely longitudinally rugulose or striate. The scutellum is distinct and often convex or projecting behind. The propodeal teeth are usually lower and broader than in the worker. The mesopleurae tend to be smooth and shining even when opaque and punctulate in the worker. The enlarged mesonotal dorsum quite often bears additional ground pilosity of the same type as is found on the head, and also some specialized erect hairs like those found elsewhere on the body. The color may be as in the worker, but usually is a little darker.

The wings are as in *Strumigenys*; in all cases the venation of the forewing is very much reduced, the species showing further reduction paralleling that seen in *Strumigenys* species. The most frequently well developed elements remaining are $R + Sc$, stigma, $2r$, $M + CuA$, CuA and "basalis" ($Rsfl \cdot Mfl$). The others are usually present only as ill-defined grooves or are entirely absent. The posterior wing is long and narrow, with the long bordering microtrichia posteriorly as developed in other very small ants; only one poorly defined vein present in the basal half of the costal region. Hamuli 4 in number, weak, decreasing in length from base toward apex, placed a little beyond the midlength of the costal border in a close series.

Male: Relatively few of the males are known. They are usually larger than the workers, but slender, and not so large as the female. The head is much reduced and more normal in shape, much like that of other myrmicine genera, with a robust inverted-teardrop shape. The eyes are very prominent, large and convex, situated well in front of the middle of the head and usually

close to the mandibular insertions. Mandibles degenerate, usually but not always lacking serial dentition; in closing, the apices may or may not meet. The under-mouthparts are large by comparison, and the mandibles are shorter, or at least not greater in length than the greatest diameter of an eye. Notauli and parapsidal furrows are present on the mesonotum, but are variably developed, the former especially often disappearing before reaching the postero-medial point of juncture. The propodeal teeth and infradental lamellae are more or less strongly reduced. Petiole and postpetiole low and gently rounded, usually smooth and shining dorsally, as in the gaster. The basal gastric costulae are usually absent, rarely present but vestigial. Spongiform appendages are often present as vestiges, but are rarely anything like as well developed as in the worker. Antennae 13-segmented, the scape very small, not or only slightly larger than the remainder of the segments. Genitalia formed into a compact, usually retracted capsule, the individual parts much as in *Myrmica*. The volsellae appear to vary with species or species-groups, but so few have been figured that it is difficult to follow relationships by means of these structures. The volsella (see Plate III) consists of a large digitus with an arm placed at a right angle to the body, a smaller cusp, seemingly firmly fixed and flattened, placed at the side of the digitus. There is also usually present an angle or point, bearing a number of hairs and projecting ventrally from the base of the digitus so as to oppose the tip of the digital arm. The hairs are not shown in the plate given here, but they may in the future show characters of importance in their arrangement and relative lengths. The angle or point mentioned seems to be rather constant in many myrmicine groups, and it may be termed the *piliger*, since no one seems to have put forward a name for it to date. The relative sizes and shapes of these various parts seem to furnish the best characters for recognition, together with the mandibles and eyes.

The sculpture is in general like that of the worker, but with more smooth areas; sculpture and development of propodeal spines may vary considerably even among the individuals of one nest. Pilosity is reduced and usually very fine, lacking most of the bizarre elements that may be seen in workers and female, although there are often long, fine hairs present in positions corresponding to those of the specialized erect hairs in the female castes. The color is darker than in the worker, the head and often the thoracic dorsum being close to black in some species, while the remainder of the body is mostly deep castaneous or other shades of brown. I have yet to see any individuals that were jet-black. The male caste has been very much neglected in the systematics of the group, and even when descriptions have been set forth, the essential characters of the mandibles and volsellae have only very rarely been described. It is very possible that other parts of the genitalia, such as the serrate-edged aedeagus or the parameres, will show characters as good or better than those of the volsellae, but this will require many specimens and more time for refinement of techniques than I could allow during this work. Eventually, we will probably need to know the male characters in order to answer otherwise imponderable questions of phylogeny, and this is the chief importance of the caste to the dacetine systematics. It is at present impossible to state a general character that will separate the members of the caste from one

higher dacetine genus to another, although it is frequently possible to recognize the species.

BIOLOGY

The very interesting and specialized habit of feeding upon Collembola appears to be widespread in the genus, at least in the Nearctic Region, and this has been discussed elsewhere. There remain a number of generalities that can be made concerning general ethology and ecology, although the data for regions other than North America are exceedingly rare and vague. The genus is usually associated with a rotten-log habitat by myrmecologists, for it has been in such places that a large number of the forms are habitually collected. Recent evidence in the form of Berlese funnel samples of forest floor and even rich, grassy, open areas, however, indicate that the number of forms to be found living in the soil or soil cover proper may be much greater than that of forms preferring rotten logs. Furthermore, as will be discussed later, there is a very rich dacetine fauna, but one now virtually unknown, that is partial to arboreal or subarboreal existence in epiphytes or other plant cavities. Several forms, especially the tramp species of the higher dacetines and including at least two *Smithistruma*, exist very well in relatively dry and inhospitable climates. One can say only that available collections, and these quite scarce, tend to show that *Smithistruma* is best adapted in general to a life in forested regions with a mild climate. It is probably much more to the point to say that most or all species are limited first by the abundance of suitable collembolan prey and then by temperature.

The colonies are usually small, rarely containing over 300 workers as presently recorded, but even relatively small nests are usually pleometrotic. The nest is a small chamber, oval in shape, but is usually much larger than would seem necessary for containment of the adults and brood. Furthermore, there may be one or two other similar chambers placed within a short distance of the brood chamber, but the latter usually contain only a few adult ants. Many possible uses of such a chamber in capturing springtails come to mind, but there are no observations of any concrete sort to bolster any kind of speculation at present concerning the function of the cells. The nests may be built in soil cavities, in or under rotten logs, under stones, in small twigs, nuts, etc., etc.

The larvae are whitish in color and rest motionless or nearly so in the brood chambers. They are well cared for by the workers, which feed them at least part of the time by placing them directly on top of freshly-killed springtails. In my particular colony of *S. rostrata*, I never once observed regurgitation from worker to larva, but since my colony did not seem very healthy or vigorous, I would certainly not say that the larvae are never fed by regurgitation in nature. I have not attempted to examine the morphology of the larvae, but have been accumulating larvae of various species to send to Dr. G. C. Wheeler, who has been conducting a morphological survey of the larval formicids tribe by tribe. He can undoubtedly examine these forms more efficiently than I can in relation to other groups.

Solitary females have been found isolated in chambers of much the same size occupied by the brood of a mature colony; although I know of no cases where such a female was found definitely accompanied by eggs or brood, I

assume that these individuals were founding nests in the usual way. No parasitic forms of *Smithistruma* are known definitely to exist, but it would not be surprising to find that such forms do occur. Certain species of *Smithistruma* commonly nest or forage in the chambers of other kinds of ants, and they apparently choose such a habitat because of the large numbers of collembolans often swarming in formicaries.

The nuptial flight has not been observed for any species, but it is known from accumulated evidence to occur at the end of the summer in temperate North America.

Because of their extremely slow-motion, deliberate movements in locomotion, their small size and their coloration, as well as their frequent habit of feigning death when disturbed, individual workers or colonies of *Smithistruma* are very difficult to locate. Once one has acquired an eye for them, however, they may be found very abundant in favorable areas. In south-central Ohio, the Wessons commonly found as many as fifteen or twenty nests in a single day's collecting. Berlese funnelling by the staff of the Illinois State Natural History Survey in the course of a general insect survey, and similar work in Collembola-rich areas of North Carolina by Dr. D. L. Wray show that *Smithistruma* is widely distributed and common throughout much of these states. They are, of course, absent or very rare in true desert areas where the collembolan fauna is reduced, and there are many apparently favorable areas within their range where one cannot find them by any method. For more detailed accounts of biology, it is suggested that the works of the Wessons be referred to.

DISTRIBUTION AND REMARKS

The known species of *Smithistruma* (56) probably constitute less than a third of the existing species. Therefore, any generalizations of a zoogeographical nature must remain tentative. By major regions, the number of known species is as follows:

Nearctic*	23	Temperate East Asian	2
Neotropical†	25	Indomalayan	6
Ethiopian	4	East Papuan	0
Malagasy	0	West Papuan	1
Mediterranean	3	Australian	0
Oceanian	2		

* Not including *margaritae*. † Including *margaritae*.

No species are known from Chile, New Zealand, or the Holarctic Region very far north of 45°N. The Nearctic and Mediterranean Regions are well known and are not expected to yield very many new forms. Large numbers are expected from Neotropical, Indomalayan and Temperate East Asian Regions, since these regions have scarcely begun to be properly explored. The African continent south of the Sahara certainly contains more species, but here the numbers seem to be limited, probably by competition with *Serrastruma*. Compared to the genus *Strumigenys*, which seems to be about similarly well collected and which contains roughly three times as many species, the distribution of *Smithistruma* shows greater strength in the Temperate Zones. In Europe, no species of *Strumigenys* occurs at all; in the Orient,

one species (*Strumigenys lewisi*) is found north to near 40°, and another rarer species (*solifontis*) inhabits southern Japan; in North America only one primarily Neotropical *Strumigenys* occurs, and this probably does not reach 40°N. Only three species of *Strumigenys* are known from between 30° and 40°N., while this same belt supports 28, or 50% of the known species, of *Smithistruma*.

Biologically, one might say that *Smithistruma* is a rather inefficient predator. This may be even more true when thorough comparisons can be made against *Strumigenys*, as observations of Wilson (in litt.) suggest. In other ways, however, *Smithistruma* is better suited to life in cooler climates, or at least many of the species are, in comparison to the overwhelming majority of *Strumigenys* species. *Smithistruma* in North America shows rigid adherence to a seasonal cycle in the time of nuptial flight and in other habits, while *Strumigenys louisianae* in North America follows the cycle in a much more erratic way. These facts seem to show that the Temperate Zone *Smithistruma* in North America behave as though well-acclimatized, while the single *Strumigenys* species, which has its main range in the Neotropical Region, does not. Other evidence shows that *louisianae* is a rapidly expanding species which has relatively recently entered the North Temperate as well as the South Temperate Zones. It has many very close relatives in Central and South America, mostly undescribed at present, but represented in my working collection, and it is more variable nearer the center of its range (South America) than in North America. Much of the same situation exists in Temperate East Asia, where the two *Strumigenys* species, while known only from temperate regions, belong to the rapidly expanding and dominant *godeffroyi* group. The *godeffroyi* group otherwise consists of a large number (about 30) of very closely related tropical Indomalayan species.

While the three major *Strumigenys* faunas (Neotropical, Ethiopian, and Indo-Australian) show little close relationship to one another, the *Smithistruma* species of all continents seem much more closely related. These relationships are pointed out in another section, where it is noted that an especially close one exists between the faunas of eastern North America and temperate East Asia. All this indicates that *Smithistruma* was (1) more recently evolved than *Strumigenys* and (2) that at least the North American species of *Smithistruma* are derived from ancestors that crossed the Northern Filter Bridge from Asia later than the last contact occurred between any of the three major *Strumigenys* faunas.

Thus, it appears that while *Smithistruma* has proven relatively inefficient as a predator, it has been able to exploit resources in the form of the swarming collembolan populations of the North Temperate Zone and thereby avoid the areas where the more efficient hunters held sway. I think, after reviewing the possible relationships of the groups in the various faunal regions, that *Smithistruma* must have had its origin from *Strumigenys* or a genus closely related to *Strumigenys* somewhere in the Old World, possibly in Africa. The African species are little known, but from the diversity of the four recognized species, one can see that the continent must have supported a large and varied fauna in the past, a fauna now being decimated by the dominant African dacetine group, *Serrastruma*. *Serrastruma*, in turn, appears to have been

derived from *Smithistruma* or a *Smithistruma*-like form within the African continent, and this now dominant genus seems to have begun its spread from Africa outward. It has occupied Madagascar and the larger islands in the Gulf of Guiana, and has reached Mauritius and even the shores of Hawaii as stowaway cargo in human commerce. Within the African continent south of the Sahara, *Serrastruma* shows its vigor by reaching high altitudes in the cool, wet mountains of East Africa and by its successful occupation of relatively arid regions in South Africa and Nigeria; it is abundant in species and individuals in the Congo rain-forests.

I mention the present state of affairs with regard to *Serrastruma* in order to illustrate the possible way in which *Smithistruma* arose, gained dominance and adaptability to climates and moved outward to begin a steady colonization of the world. This colonization has been interrupted by the glaciations and has not proceeded for a long enough time to allow *Smithistruma* to reach extreme limits reached earlier by *Strumigenys* in Australia, New Zealand or Papuasia, where water barriers form formidable obstacles to the weak-flying, deciduous-winged females. One or more waves of migration have carried *Smithistruma* to North America and beyond; it appears in the form of three known species in the relatively temperate area in southern Brazil and northern Argentina, and is apparently at home in arboreal situations in the cool cloud-forests of northern South America; at least three species have become adapted to true tropical conditions and presently challenge even the dominance of the ubiquitous *Strumigenys louisianae* within its home range.

In this discussion, I have borrowed heavily from the ideas put forward by Darlington (1948) in his study of the distribution of the cold-blooded vertebrates. While I realize that I may be chasing my theoretical tail, I must state that from the present evidence, incomplete as it may be, Darlington's argument fits *Smithistruma* and *Smithistruma* fits Darlington's argument. Furthermore, both arguments fit the strong morphological evidence that *Smithistruma* has been derived from *Strumigenys* or something very close to *Strumigenys*.

NEARCTIC SPECIES OF SMITHISTRUMA

In North America, there occur 24 known species of *Smithistruma*, including two that fall in the subgenus *Wessonistruma*. *Wessonistruma* is indigenous to the continent. Of the 22 species of *Smithistruma* s. str., *S. margaritae* belongs to a Neotropical group and has its main range south of the United States. *S. (W.) pergandei* is the only species known from Canada, and even this species just barely manages to reach the border on some small islands in Lake Erie. Only one species, *S. californica*, is known from west of the Great Plains, and this Californian species may represent an introduction. Nevertheless, there are other indications, discussed farther below, that *Smithistruma* may occur in the Pacific Northwest.

By elimination of the exceptions, one sees that the genus as found in North America is by far best developed in the temperate forest regions of the eastern United States from the Great Lakes to the Gulf of Mexico. Within this region many species of the genus are often common, but due to their small size and cryptobiotic habits they are not familiar ants even to many myrme-

cologists. The discovery by L. G. Wesson that certain species feed exclusively or nearly exclusively upon Collembola has raised a great deal of interest in the United States, so that many students have started collecting them. Due to this fact and also to the increased use of the Berlese funnel in general entomological collecting, the records have increased during the past ten years out of all proportion to the previous rate.

Fortunately, due to the excellent and temperate taxonomic work of Dr. M. R. Smith and the Wessons, the systematics of the Nearctic species has kept pace with the biological findings. In comparison with other faunas, this one is excellently known and in need of little adjustment.

Except for *S. margaritae*, all the Nearctic species are related in that the workers and females have the basal mandibular lamella acute and dentiform. Even *Wessonistruma* seems to be only an extended aberrant stock closely related to certain of the other sympatric species. The closest relationship of the whole fauna seems to be with that of Japan and China, since closely similar members of the *rostrata* group occur in these temperate Oriental Regions. A more uncertain relationship occurs through the *rostrata* group with species like *orchibia* of the Neotropical Region. *S. margaritae* has almost certainly invaded the United States within comparatively recent times. It acts suspiciously like a tramp species in its occurrence about port areas and in the West Indies, although there is a possibility that its original range did run up the Texas coast.

Due to the former competent coverage of the taxonomy, I have been as brief as possible in my characterizations of the species. The descriptions are usually limited chiefly to corrections of minor errors in former works, to description of sexual forms not formerly reported upon, and to more thorough characterization of features in the worker caste which do not seem to have received the proper attention. I have included figures of many of the mandibles, since these have not formerly been very well attended to, and also representative male volsellae. The best of Dr. Smith's figures are included with his kind consent and aid in order to give an idea of general habitus in some of the groups.

The best former references are those of Smith (1931), L. and R. Wesson (1939) and Emery (1895). Dr. W. S. Creighton has also covered the group in his book on the ants of North America, the publication of which is expected momentarily as this is written. Dr. Creighton's work has been so long in the preparatory stage that he has not been able to include the changes of names among the genera as I have recorded in my original generic revision; therefore, he still has (at least in the manuscript now with the printer) all of our North American species placed, as Smith left them in 1947, under *Strumigenys* (*Trichoscapa*). I have read the manuscript and discussed it at length with Dr. Creighton, and I know in detail his opinions on the various species of our fauna. Due to the fact that the book has not been published at this date, I cannot discuss these opinions here; nevertheless, I think I have covered sufficiently the evidence for my placement of species where Dr. Creighton's treatment differs. I am satisfied that the present treatment of the various forms is the best that I am capable of on the basis of the available material and after the consideration of the opinions of all other North Amer-

ican specialists brought to my attention. The study material includes the great majority of specimens available to all former North American myrmecologists plus a number of more recent collections greatly exceeding the total number previously published upon and embracing wide areas from which few or no dacetines have hitherto been reported.

I am especially indebted to Dr. M. R. Smith of the United States National Museum for his constant and patient aid in the matter of material and advice. Any success which this section of the revision may enjoy is due in large part to his efforts. Many other individuals, especially Mr. L. J. Stannard of the Illinois State Natural History Survey, Dr. L. G. Wesson, Dr. D. L. Wray, Mr. E. O. Wilson, Dr. Mary Talbot, Lt. J. W. Jones, Jr., Dr. A. C. Cole, Jr., Mr. D. W. Pfitzer and others mentioned in the list of acknowledgements at the beginning of this work have sent large series of specimens with extremely full and valuable ecological data, making it possible to give general statements concerning the biology of many species.

The taxonomy of the Nearctic species, while considerably better known than that of other faunas, still leaves plenty of room for improvement. Several forms, such as *brevisetosa*, *pilinasia*, *reflexa*, *missouriensis* and perhaps one or more of the new species I have recently described are known from too few collections for final judgments concerning their status. There is little doubt that another decade will bring changes among these forms as regards synonymy and decisions on possible geographic races at present unrecognized. Furthermore, there are almost certainly a few more species remaining undescribed. Exploration of the grass-tussock and epiphyte faunas in the Gulf State area should reveal new forms, and Cole's lost species remains to be rediscovered in northern California, possibly accompanied there by still other unknown species. The fauna of the moist and temperate parts of Mexico remains completely unknown, but some species either of Nearctic or Neotropical groups must occur in that region. *Smithistruma* should be looked for in any habitat south of the Canadian Border that supports an abundant collembolan population.

The biology of the Nearctic species has been covered in some detail in the works cited above, and several other writers have given details of nesting habits for occasional species. Nearly all of the really common species of both subgenera occurring in the region are known to subsist chiefly upon Collembola, which creatures they capture alive by the employment of stealth and possibly also by the aid of the bizarre pilosity and spongiform appendages so characteristic of the *Strumigenys* complex. Much remains to be understood about the means by which the prey is captured. There is now little doubt remaining that at least some species show a high degree of selectivity in choosing prey from among the various families of Collembola; springtail species with a well developed springing apparatus or furcula seem to be preferred, while species lacking the furcula so far tried have usually been shunned as prey by the ants. Mr. E. O. Wilson of the University of Alabama is presently engaged in intensive studies of the feeding habits of this and other dacetine genera occurring in the United States. He has already made many very interesting observations that will undoubtedly, when published, give us a clearer picture of dacetine biology.

Up to the late 1930's most of the *Smithistruma* species described from the United States were those found in rotten logs and stumps, but with the work of the Wessons in southern Ohio and the flood of Berlese funnel material that has begun to arrive on the desks of myrmecologists, it has become increasingly clear that there exist a number of species restricted in habitat to the soil cover, often in quite open, grassy areas distant from forest growth. Such species are *ohioensis*, *talpa*, *ornata* and probably some of the species, including *bimarginata* and the new forms, that are known only from one or two collections. Other species like *dietrichi* and probably also *pulchella* and a few others, appear to be restricted entirely or almost entirely to nest sites in large masses of rotten wood in the form of logs, stumps or rot-holes at the bases of trees. A large number of species, as might be expected, will nest in either habitat without apparent preference; among these are members of the *clypeata* group and the common species *pergandei* and *rostrata*. I have discussed nesting habits under the species in such detail as was warranted by the information available in each case.

The nests are small, usually comprising only 100 or even fewer individuals, but maximum numbers of workers in larger nests are probably greater than has been reported. I consider it probable, on the basis of a few of my own observations, that nests containing 300 or more workers are not uncommon in the ecologically most suitable areas. Nests containing more than 30 workers generally contain more than one dealate female, although there are no observations recorded suggesting the means by which this pleometrotic condition originates. The finding of many solitary dealate females during the winter and spring in temperate latitudes suggests that the method of nest founding is the usual one among ants, while the readiness of the queen to forage even after the nest is well established perhaps shows that she hunts actively during the incipient period of the nest while she is alone. Another possibility is that the seemingly unnecessarily large size of the nest chamber has something to do with bringing Collembola within range of the queen and also of the workers in established nests.

In the United States, the winged forms usually appear in the nest during August. This has been confirmed by many dated specimens sent me from all over the eastern United States. In a few cases, specimens have been taken on the wing before the middle of August (see M. R. Smith, 1931, p. 699) in Illinois, so that winged adults may occasionally be present in the nest at the end of July. Records of winged phases in the nest cover species of both subgenera, include all of the common species but *ornata* and *dietrichi*. The winged forms of these two species remain unknown. Correlated with this information is the record concerning the captures of solitary females. Through the very full data sent by my correspondents, I have been able to trace nearly all of our species through the autumn, winter and early spring as solitary female records. I think the evidence is sufficiently strong that I may hazard the generalization that all of our *Smithistruma* species produce winged forms late in the summer, the nuptial flight (which has not been observed) taking place in August, or in the South possibly during September. The females then spend the winter in solitary seclusion, perhaps feeding on collembolans active during the warmer winter days. The first workers do not hatch until

late in the succeeding spring. The females of *S. margaritae* may follow this schedule in the Gulf States, for Mr. Wilson has taken solitary females in Alabama during October and November. With regard to this species, we need to know whether or not winged forms are produced earlier in the summer.

The regularity with which most of our North American *Smithistruma* follow this cycle of production of sexual forms and nest-founding suggests, in contrast to the more irregular *Strumigenys louisianae*, that the species of the true Nearctic groups have been acclimatized for a long time in temperate regions. It may be suggested, in view of the close relationships with the East Asian fauna, that the Nearctic fauna arrived by way of the Bering Land Bridge, reaching the North American Continent during milder preglacial times. A few of the species do not occur in the extreme southeastern United States at all except at fair heights in the Appalachians, and others seem to be rarer and more depauperate in the Gulf States, especially in Florida, than they are in the states between the Great Lakes and northern Mississippi and Alabama. I think this evidence runs counter to the opinion of Wheeler, expressed on several occasions, that the Nearctic dacetines as a group have migrated northward from the Neotropical Region.

Identification of *Smithistruma* specimens is a rather tricky business, requiring a certain amount of experience even when suitable keys and illustrations are available. The insects are quite often covered with a whitish granular substance, apparently a secretion of some sort and occurring in living specimens, that may obscure certain details and thereby change the habitus quite radically. Depilated specimens are another source of confusion, and determinations based on single strays in which most of the hairs are missing must always be considered doubtful.

Subgenus WESSONISTRUMA Brown

Smithistruma (*Wessonistruma*) Brown, 1948, Trans. Amer. Ent. Soc. 74:106. *Strumigenys* Emery, 1895, Zool. Jahrb. Syst. 8:326, part. (not Fred. Smith 1860). *Strumigenys* (*Cephaloxys*) Emery, 1922, Gen. Ins. Fasc. 174:325, part. M. R. Smith, 1931, Ann. Ent. Soc. Amer. 24:688, part. *Strumigenys* (*Trichoscapa*) M. R. Smith, 1943, Amer. Midl. Nat. 25:307, part. 1947, Ibid. 37:585-587, part.

Includes two aberrant Nearctic species, *pergandei* and *angulata*, easily distinguished by the short, broad clypeus and the elongate, sublinear mandibles, the latter subequal to the clypeus in length, with greatly exaggerated distemata so that the apical series of teeth occupy only a relatively small portion of the inner mandibular margin near the apex. Basal lamella stout, acute, dentiform, situated anterior to the clypeal border, visible in entirety at full mandibular closure. Head in general rather broad, with rounded and distinctly laterally expanded occipital lobes and parallel or subparallel preocular laminae. Pilosity of head and alitrunk consisting largely of short but broadly expanded spoon-shaped and spatulate hairs. Other characters as in Nearctic *Smithistruma sensu stricto*. The female has the characters of the worker.

The male of only one species (*pergandei*) is known; this differs but little from other Nearctic *Smithistruma* males, and is best described under the species heading below.

Of the two species, *pergandei* is a common species inhabiting the tier of states along the southern shores of the Great Lakes and other cooler regions

in the eastern half of the United States, while *angulata* is a much rarer species occurring in the Mississippi Valley and Gulf States.

Wessonistruma is clearly related to the other *Smithistruma* species of the North American fauna. There are also many morphological similarities to a female of an undescribed genus and species sent for comparison by Dr. K. Okano from Japan; Dr. Okano's genus is in turn very closely related to the European *Epitritus* Emery. It is very difficult to tell whether the similarities between *Epitritus* and *Wessonistruma* are due to convergence or to near ancestry. I believe that the examination of the *Epitritus* male and that of the new Japanese genus, when found and certainly associated with the opposite sex, will help greatly in solving this phylogenetic problem.

The biology of *S. (W.) pergandei* is rather well known, for it was upon this species that L. G. Wesson made the first observation of the specialized predation on collembolans now known to be characteristic of widely separated higher dacetine groups. While *pergandei* is rather flexible in its nesting habits, it is quite often found in the nests of ants of other tribes. Too few records of *angulata* are known to permit of the present safe statement of ethological generalizations concerning it.

SMITHISTRUMA (WESSONISTRUMA) PERGANDEI (Emery)

Text-fig. 5, Pl. 3, fig. 29

Strumigenys pergandei Emery, Zool. Jahrb. Syst. 8:326-327, Pl. 8, figs. 17, 18, worker, female, male. *Strumigenys pergandei* Forel, 1901, Ann. Ent. Soc. Belg. 45:339. Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24:148, worker, in key. 1910, Ants. Columbia Univ. Press, N. Y., pp. 24-25, fig. 11D, female wing. Kennedy and Schramm, 1933, Ant. Ent. Soc. Amer. 26:95-97, 100, biology. L. Wesson, 1936, Ent. News 47:171-174, biology. *Strumigenys (Cephaloxys) pergandei* Emery, 1922, Gen. Ins. Fasc. 174:325. M. R. Smith, 1931, Ann. Ent. Soc. Amer. 24:698-699, Pl. I, fig. 4, worker. L. and R. Wesson, 1939, Psyche 46:91-92, biology, p. 110, in key. Buren, 1944, Iowa State Col. Jour. Sci. 18:290, Iowa records. *Strumigenys (Trichoscapa) pergandei* M. R. Smith, 1943, Amer. Midl. Nat. 30:307. 1947, Ibid. 37:587. *Smithistruma (Wessonistruma) pergandei* Brown, 1948, Trans. Amer. Ent. Soc. 74:106.

Worker: TL 2.59-2.88, HL 0.63-0.68, WL 0.62-0.72, CI 70-74, MI 28-31. Previously well described and figured; readily recognized by most specialists who have to deal with the species. Clypeus with a nearly flat surface, averaging 1.4 times as broad as long, its free border broadly and evenly rounded except for the anterior portion, which is transverse and nearly straight. Mandibles averaging about 9/10 the length of the clypeus, slender and very gradually tapered toward the apices, slightly curved, converging gently and meeting only along the short apical (masticatory) borders. Basal mandibular tooth sturdy, strongly acute, situated a short distance anterior to the clypeal border and fully exposed at normal closure. Diastema very large, occupying approximately as much of the length of the inner mandibular border as the apical series of teeth, the latter consisting of three or four short acute teeth alternating with teeth modified into low, rounded lamelliform lobes; both teeth and lobes becoming gradually shorter toward the apex. The apex curved gently ventrad, bearing the usual four minute preapical denticles and a stout apical tooth. Antennal scapes strongly bent near their bases, somewhat incrassate and depressed. Apical segment of funiculus about as long as the first four funicular segments taken together. Labral lobes ("maxillary lobes" of Wesson) prominent, slender, at least half as long as the mandibles when in the extended position.

Alitrunk seen from above with a broad, laterally convex pronotum, the latter feebly submarginate dorsolaterally and weakly longitudinally carinate medially. Mesonotum separated from the pronotum by a usually moderately distinct, rather narrow semicircular sulcus; mesonotal disc anteriorly only slightly more than half as wide as the pronotum, posteriorly narrowed, the sides forming shallow even concavities with the sides of the propodeum; propodeum widening slightly posteriorly. Seen in profile, anterior part of

mesonotum forming a low, obtuse peak, leading up to which the pronotal outline is very weakly convex; the remainder of the mesonotum together with the propodeal dorsum forming a very feeble concavity. Petiolar peduncle very slender, tapered anteriorly, node a bit more than one half the width of the postpetiolar node; convex dorsally, as in the postpetiolar node; somewhat shining in most specimens, at least over the posterior half or more of the nodal surface. Propodeal teeth lamelliform and rather small, with fairly broad infradental lamellae becoming broader and convex ventrally.

Head hairs mostly broadly and suborbically spoon-shaped or spatulate, the broadened portions lying close to and parallel with the integumental surface, each with a short, inconspicuous peduncle. Free clypeal margin and anterior border of scape with slightly longer spatulate hairs projecting anteriorly as a fringe; these short in the center of the free clypeal border and at both ends of the scape. The squamose hairs become sparser on the upper dorsum of the head, but are still fairly abundant and are a little larger than those densely crowded on the clypeal disc. Alitrunk dorsally with more sparsely arranged spoon-shaped hairs bending toward the midline. Both nodes with small, distinctly spatulate appressed and reclinate hairs sparsely arranged on their dorsal surfaces and a few longer, fine hairs on their lateral surfaces, all directed posteriorly. Dorsum of gaster with a few fairly long fine erect hairs, several of which may be weakly broadened or truncate at their apices.

Color usually medium ferrugineous throughout.

Female: Compound eye long-oval, greatest diameter about 0.12 mm. Except for the usual differences of full sexuality, very much like the worker. Mesonotum with punctulae arranged in longitudinal lines forming a kind of fine striation. Mesonotal pilosity like that of head, but a little less abundant. Described from Virginia, Pennsylvania and Ohio specimens.

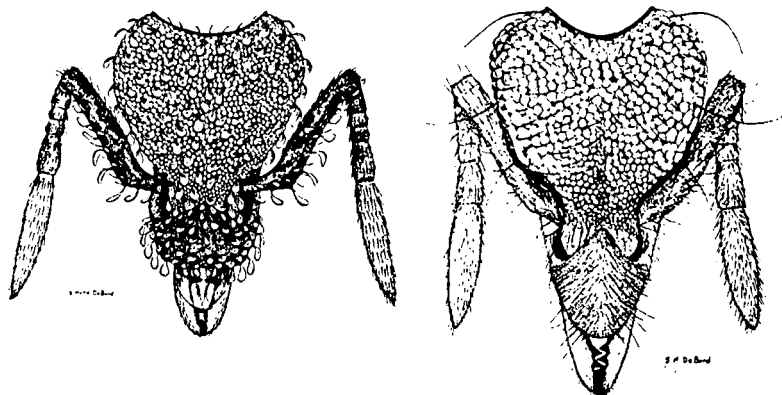
Male: TL 2.62-2.80, HL 0.55-0.57, CI 72-74. Full length of average mandible, measured along external border, 0.17-0.19 mm., greatest diameter of eye 0.18-0.20 mm., always slightly greater than the length of a mandible; eye distant from mandibular insertion by about half its greatest diameter. Mandibles edentate, acute apically, the two apices meeting at closure; apical and basal borders distinct, separated by a low curve or rounded angle. Notauli and parapsidal furrows feebly marked, the later becoming obsolete posteromedially; sculpture of scutum and scutellum as in female. Nodes moderate in size, shining above; ventral spongiform tissue distinct and reticulated, but small and narrow compared to those of worker. Propodeal teeth represented by low, blunt subrectangular processes; infradental lamellae reduced to carinae which are feebly broadened and reticulate ventrally. Gaster broad, smooth and shining throughout.

Color sordid medium ferrugineous; head entirely or in part much darker; legs, mandibles, antennae and genitalia ivory yellow. Forewing length 2.40-2.45 mm.; venation as in Wheeler's figure (loc. cit.), more nearly complete than in *pulchella*. Volsella larger than that of *pulchella*, *talpa*, etc.; similar in size and form to that of *rostrata*, the digitus not noticeably constricted and rather acute at apex. Described from four males from Ohio and Virginia. See original figures of Emery.

Type material representing all three castes presumably in Emery Coll. and in other European collections. *Type locality:* Washington, D. C. (T. Pergande), restricted by Smith, 1931. Other original localities cited by Emery are Maryland (T. Pergande) and Beatty, Pennsylvania (P. J. Schmitt). Specimens from all three localities in various North American collections marked "type" are probably only nidotypes; there is no certainty that Emery has examined any of these specimens.

I have examined material from all of these original collections, plus about 65 nest series and numerous strays. I shall forego the listing of these localities in their entirety, but the unusual range of the species, now considered to be nearly completely known, is outlined by the citation of a few of the collections seen plus some Iowan records by Buren considered as completely trustworthy without a check on the specimens. *Pergande* occurs in a broad belt extending from eastern Massachusetts and northern Virginia west through Pennsylvania, Maryland and southern New York, blanketing Ohio and extending to islands in Lake Erie, even to those along the northern shore of the lake. It probably occurs in much of Indiana, and is known from northern and central Illinois from collections by the Illinois Natural History Survey and by Dr. Orlando Park. Records from deep in Iowa include Boone, Holy Cross and Bellevue (W. Buren, loc. cit.). In the Appalachians, the species is found at least as far south as northeastern Tennessee, where

it has been taken in the Holston Mts., Sullivan Co. (J. W. Jones). In central Pennsylvania (Centre Co.), in an Appalachian Valley at 1200 feet altitude, it is rare (W. L. Brown), but farther south it occurs at 2500 feet at Draper Mt., Pulaski Co., Virginia (B. D. Valentine). Well over 100 colonies seem to have been taken in Ohio by the Wessons and by Dr. C. H. Kennedy and students, and this state appears to be at the center of the range and is also perhaps the most favorable area ecologically for the development of the species. The heavily and very systematically collected state of Illinois shows relatively few records by comparison, and even these records are from the central and northern sections. I have often doubted Forel's record of the species from Boston, since three seasons of sporadic search in likely areas around the city have failed to yield a single specimen. I was therefore greatly surprised to receive specimens from a Berlese funnel sample taken from leaves and trash accumulated at the base of the steps in front of the Biological Laboratories at Harvard University, steps over which I have passed continually for three years. These specimens were taken by Mr. Kenneth Christiansen, a fellow student, who was collecting springtails from the litter gathered along the bases of the steps. I returned with Mr. Christiansen to the same spot the following day and found a number of additional workers, but the nest itself could not be located. This record, Cambridge, Massachusetts, appears to be the northernmost locality from which the species has been recorded.



Text figs. 5, 6.—5. (left) *Smithistruma* (*Wessonistruma*) *pergandei* (Emery), worker, head in full-face view (after M. R. Smith); 6. (right) *Smithistruma* (s. str.) *laevinasis* (M. R. Smith), worker, head in full-face view (after M. R. Smith).

The biology of this species has been described by the Wessons in considerable detail; in his paper of 1936, Dr. L. G. Wesson was the first to record the collembolan predation of this ant, a habit which is apparently shared by many other dacetines of the higher genera. Nesting habits have been outlined by the Wessons and by Kennedy and Schramm, and the abundant ecological notes furnished with specimens by various correspondents show that the observations published by the earlier authors will serve to describe the nest sites in all parts of the range. *Pergandei* is very flexible in this respect, and it will nest in rotten logs, in the soil, or under stones in the soil. It is very often found in the nests of larger ants, where it probably preys on *Cyphodeirus* and other myrmecophilous collembolans. I have taken 224 workers and 3 queens from a rotten log in a city park in Philadelphia, and so many workers escaped that I consider this nest to have had a population of close to 300 adults.

While L. G. Wesson thought that *pergandei* showed no prey preference among the families of the Collembola, observations made by Mr. E. O. Wilson (in litt.) and myself indicate that there may exist rather strong selectivity with regard to prey among other species of *Smithistruma*. A vial with a series of *pergandei* from Draper Mt., Virginia (B. D. Valentine) mentioned above, contained mangled specimens of *Entomobrya pur-*

purascens Packard (2); *Pseudosinella petterseni* Börner (3); *Hypogastrura macgillivrayi* (1). The last-named specimen was in relatively good condition, and may or may not have been a part of the prey of the ants. Determinations of Collembola were made by Mr. Kenneth Christiansen.

S. pergandei could scarcely be confused with any species but *angulata*, and distinguishing characters are listed under that species, described below.

SMITHISTRUMA (WESSONISTRUMA) ANGULATA (M. R. Smith)

Strumigenys (*Cephaloxys*) *angulata* M. R. Smith, 1931, Ann. Ent. Soc. Amer. 24:697-698, Pl. 1, fig. 3, worker. *Strumigenys* (*Cephaloxys*) *angulata* L. and R. Wesson, 1939, Psyche 46:110, worker, in key. *Strumigenys* (*Trichoscapa*) *angulata* M. R. Smith, 1947, Amer. Midl. Nat. 37:587. *Smithistruma* (*Wessonistruma*) *angulata* Brown, 1948, Trans. Amer. Ent. Soc. 74:106.

Worker: TL 2.24-2.41, HL 0.55-0.58, WL 0.55-0.61, CI 73-76, MI 31-33. Measurements taken from two cotypes, one of which has been designated as *lectotype* (see below), plus nine additional workers taken from a single nest in Alabama. Smith's original figure and his original description characterize this ant very well, and I need add only a few morphological details and some other data here.

Mandibles slender, about as long as the clypeus; seen from the side, their apices are slightly thickened and the extreme tips ventrally deflected. The shafts are gently curved inward, and the extreme apices meet along the short series of apical teeth. The basal tooth is a little smaller than in *pergandei*, but is placed similarly. Diastema very large, distinctly longer than the space occupied by the apical series of teeth. These teeth are all acute, and do not alternate with rounded lobes as in *pergandei*. The first tooth of the series is distinctly shorter than nos. 2 and 3.

The very angulate shape of the clypeus and the antennal scapes can be seen readily in Smith's figure (loc. cit.), although the antennae in the figure are a bit overinflated.

Pronotum with anteriorly rounded border, without humeral angles, but with dorso-lateral carinuliform margins and a distinct median carinula continuing posteriorly to metanotal groove; the latter groove fairly distinct, but only weakly depressed. Propodeal dorsum with lateral carinuliform margins, seen in profile feebly convex. Propodeal teeth moderate in size, acute; infradental lamellae deeply excised above, with a small rounded expansion below.

Petiole with a small node, not broader than long seen from dorsal view; the angle between the anterior face of the node and the peduncular dorsum partly filled in by a low cariniform edge which runs down the center of the face. Postpetiolar disc moderate in size, about twice as wide as the petiolar node, convex, smooth and shining above as in other North American *Smithistruma*. Gaster with slightly depressed dorsum; basal costulae 15-18 in number, rather coarse and extending 1/3 the length of the basal gastric tergite or slightly more.

Punctulation of the pronotum often rather low and feeble, with a faint suggestion of longitudinal striation or rugulation of the most indefinite sort; some areas may appear nearly smooth and weakly shining. Sides of alitrunk very largely smooth and shining. The pilosity of the head is similar to that of *pergandei*, but the individual hairs are relatively smaller, with the exception that the hairs fringing the free clypeal border are relatively much larger than those of *pergandei*, with a more elongate-spatulate shape. Pilosity of alitrunk consisting of a very few small subreclinate spoon-shaped hairs. Humeral pair scarcely enlarged or differentiated from other alitrunk hairs, but reflexed posteriorly. Mesonotum with a single moderately long, fine erect hair on each side anteriorly and one or two pairs of small erect spatulate hairs posteriorly. Nodes and gastric dorsum with a sparse growth of long, fine, tapered erect hairs. Neither of the two nodes with reclinate or other spatulate hairs.

Color light to medium ferruginous.

Gynetype female, dealate: TL 2.72, HL 0.64, CI 75, MI 32. Differing from the worker in the usual ways; color little if any darker. Deposited in INHS. Taken singly from the soil cover at Herod, Illinois on May 17, 1944 (H. H. Ross and M. W. Sanderson).

Male unknown. Material examined consisted of the gynetype just described, from Illinois; two worker cotypes [MCZ]. Other cotypes are in the USNM, but I have not examined these. *Type locality*: Louisville, Mississippi, nest in a crevice in a rotten log in

a dense woodland thicket (M. R. Smith). A fair-sized series has also been studied from a collection made in Moody Swamp, Tuscaloosa Co., Alabama (B. D. Valentine). I add excerpts from Mr. Valentine's letter concerning this series:

"The first collection in Moody Swamp, made on May 9, 1949, is from a colony of *Strumigenys* [*louisianae* Roger] nesting in a very rotten and mushy pine stump. The *Strumigenys* were under the bark and also in the wood to a depth of about two inches. The single *Smithistruma* [*angulata*] queen was with the *louisianae*, as were some mutilated Collembola. Three days later, I returned to the same spot, hoping to find some more *Smithistruma*. A few yards away was a small colony of [*angulata*] under the bark of another wet and rotten pine stump. These were at ground level, while the May 9 collection was made an inch or two below the top of the stump (which was about 20 inches tall)."

By a curious coincidence it happens that before I became acquainted with Mr. Valentine, I found that of three specimens labelled as cotypes in the Museum of Comparative Zoology, all from Louisville, Mississippi, one individual was actually a specimen of *Strumigenys louisianae*. Whether this specimen was mixed in with the *angulata* types before or after collection cannot now be determined, and I have removed it from the series to prevent later confusion. The possibility, suggested by the bits of information presented, that *angulata* may sometimes start its colonies as an inquiline in nests of other dacetines should not be overlooked by future investigators. Different dacetine species are so often found nesting very close together, however, that repeated detailed observations will be required before any such relationship between two species can be considered confirmed.

The two new localities are the first reported since the type collection, and through them, the range of this rare species is very greatly extended. It probably occurs sporadically throughout much of the Mississippi Valley and the Gulf States. Distinction from *fergandei* may be made by means of the different mandibular dentition, the angular clypeus, and the differences in general size and pilosity.

Subgenus SMITHISTRUMA s. str.

CLYPEATA GROUP

This group comprises five North American forms: *clypeata*, *rohweri*, *pilinis*, *laevinasis* and *brevisetosa*, distinguishable from other North American groups chiefly by the form of the head and clypeus, which superficially resembles that of the much larger *Weberistruma* forms. The typical cuneiform head shape is shown in fig. 6, reprinted here from M. R. Smith's 1931 paper (which should be consulted for other figures of species of the group). Smith's figures show the antennae too thick, the mandibular details are incorrect, and the pilosity in the *pilinis* drawing is too fine, especially that of the clypeus, but in spite of these minor errors, the habitus is well shown. The cuneiform outline of the head is achieved by the combination of only relatively slight lateral expansion of the lateral occipital lobes with the straight, convergent preocular laminae, the latter being so placed as to fill in the outline of a straight-sided wedge with the closed mandibles at the apex.

The size range is actually higher than has been reported in the past, most specimens falling between TL 2.00 and 2.50, HL 0.58 and 0.63, with relatively slight differences between species. The head is narrow, CI varying only slightly from *rohweri* (63-66) to *laevinasis* and *pilinis* (66-69). These differences will probably be lessened when more specimens are available for measurement. The clypeus is usually approximately as broad as long, its surface more or less convex, especially near the borders, the free border broadly to fairly narrowly rounded and showing a more or less distinct tendency

toward bimargination, although the pilosity is usually so dense that the border is rather indistinct. Clypeus usually shining.

The mandibles are convex above and rather uniform in size, shape and dentition. The dorsal surface is slightly more convex than is usual in other North American *Smithistruma*, and the blade is rather robust in general, the MI ranging from 17 to 21 except in *rohweri* (13-15). The dentition, so far as has been determined, is much as in Emery's figure of *clypeata* (Emery, 1895, fig. 22). The figure given here (fig. 16) agrees in detail, even to the slight curvature of the apex of the basal tooth, and the only important divergence from Emery's figure lies in the small tooth, indicated by a dashed line, which sometimes occurs in the apical end of the diastema. Although *rohweri* and *brevisetosa* have been examined in such small series that I have not been able to confirm the exact details of their dentition, I do not doubt from what I can see that the number and positions of the teeth and basal lamella are much the same as in *clypeata*, *laevinasis* and *pilimasis*. The basal tooth is long, slender at the apex, and usually feebly deflected basad, longer than the diastema following it, the latter invisible or indistinct at full closure.

The antennae only weakly curved basally, moderately incrassate, not otherwise remarkable. The remainder of the body not very different from those of most other North American groups in general structure, rather similar among the species. Pronotum in profile moderately convex, sloping gently up to the slight, rounded-obtuse hump at the fusion point with the mesonotum. Seen from above, promesonotum oval in outline, not laterally marginate and without definite humeral angles; humeral tubercles at most weakly developed. Posterior mesonotum feebly narrowed, its dorsum weakly concave, but with a median longitudinal carinula filling out the lateral-view profile to a straight horizontal outline. Metanotal groove poorly developed and indistinct. Propodeal teeth short, acute, lamellate, continued ventrally by narrow, evenly concave infradental lamellae.

Petiole with a slender, tapered peduncle and a small, rounded node, punctulate and opaque. Postpetiolar disc transverse ellipsoid, convex, smooth and shining. Both segments with well developed and voluminous spongiform appendages. Gaster and general body sculpture of the type common to most Nearctic *Smithistruma*. Pilosity of clypeus varying with the species from finely filiform to broadly squamose and appressed. The pilosity of the rest of the body usually varies in thickness proportional to that of the clypeus. The hairs (ground pilosity) of the upper dorsum of the head are mostly long, weak and reclinate to subreclinate-arched, directed mesad. These hairs vary from finely filiform in *laevinasis* to somewhat strap-like in *rohweri*, and the pilosity of the alitrunk, while much scarcer than on the head, is more or less similar in type. Dorsal surfaces of nodes and gaster with a few long, weak, more or less erect and crooked flagelliform or hypha-like hairs. Color varying shades of ferrugineous.

The female is similar to the worker, differing from the common caste in much the same ways as do those of other species of the genus. Males are known so far only for *clypeata* (refer to that species, described below), and it is expected that those of the other four species will show few significant differences from this general type when finally discovered.

The species are relatively uncommonly collected compared to forms like *talpa*, *pergandei*, *ornata*, etc., only *clypeata* being reasonably abundantly represented in collections. For this reason, little definite knowledge may be claimed regarding their biology, although several of the species have been found either in soil nests or in rotten logs. Several of the forms feed on *Collembola*, and I have little doubt that the diets of all are similar in this respect.

The species are told one from another mainly by pilosity characters, although other distinguishing features are not lacking. Because of the scarcity of material, the distinctness of one or two of the species cannot be convincingly demonstrated at this time. *S. brevisetosa* is the shakiest of the forms I here retain as separate species, and it seems probable that it will be synonymized with *pilinasis* before too long. *S. medialis* is synonymized here under *pilinasis* with little doubt. *Pilinasis* is the most variable species in the group, and variants near it must be carefully scrutinized and compared so that the full extent of its variation will become known. Some workers have expressed to me their belief that *pilinasis* and *laevinasis* are geographical variants (subspecies) of the same species. None of these workers has examined as much material as is available to me at present, and none can reconcile the very broad distributional overlap of the two forms without production of true intergrades. "Intergrades" from east central Illinois are certainly puzzling, but I think that they must be assigned to *pilinasis* on the basis of the enlarged hairs of the middle of the clypeus. More material may show that this Illinoisian form should be described as a distinct species. Another alternative, which must be based on far more material than now exists in collections, would be the synonymy of *laevinasis*, *pilinasis* and the Illinois form under one all-inclusive and very variable species, *pilinasis*.

The group is distributed throughout the milder parts of the United States east of the Great Plains, mostly in forested regions. The northern limits seem to rest in the states stretching from Illinois to New York, and in these states, the distribution is restricted mainly to lower altitudes and river basins. A worker collected by A. C. Cole from the Oregon-California border was determined by Smith (in litt.) as belonging to the *clypeata* group, but the specimen has been misplaced.

Other authors have associated various species, such as *bimarginata*, *talpa*, and *ohioensis* with the *clypeata* group, but of these only *bimarginata* could easily be associated with *clypeata*. I believe that *bimarginata* is sufficiently different to warrant its placement in a different group. The *talpa* group differs from *clypeata* in having a distinct mandibular diastema, and the number of principal teeth in the apical series is reduced to 4. It (*talpa*) also differs in other characters which relate it more closely to *pulchella* than to *clypeata*. *Ohioensis* differs rather radically in the shape of the mandibles and in dentition.

SMITHISTRUMA (SMITHISTRUMA) ROHWERI (M. R. Smith)

Strumigenys (*Cephaloxys*) *rohweri* M. R. Smith, 1935, Ann. Ent. Soc. Amer. 28:214-215, worker. *Strumigenys* (*Cephaloxys*) *rohweri* L. and R. Wesson, 1939, Psyche 46:109, in key. *Strumigenys* (*Trichoscapa*) *rohweri* M. R. Smith, 1947, Amer. Midl. Nat. 37:387.

Worker (3 specimens, including 1 nidotype): TL 2.26-2.35, HL 0.60-0.62, WL

0.57-0.60, CI 63-66, MI 13-15. A species related to *clypeata*, differing by the following distinctive qualitative characters:

(1) Clypeal surface covered rather densely with broad, appressed white scale-like hairs, oval or suborbicular in shape and larger on the posterior part of the disc, smaller and more crowded toward the free clypeal border. Individual hairs near the center of disc larger, broader and more distinct than those of *clypeata*, so densely arranged that little of the distinctly shining clypeal surface is ordinarily visible. On the center of the free anterior border, the smaller scales are massed in such a way that the center of the margin appears to have a small blunt peak; under liquid, however, the margin is seen to be very broadly rounded, or at least with no trace of even the most obtuse peak. The hairs of the free border are not projecting as in *clypeata*, but instead are appressed in much the same fashion as are those on the center of the disc.

(2) Ground pilosity of cephalic dorsum above clypeus with broader, more spatulate or strap-like apical portions, whitish and conspicuous.

(3) When head is viewed from above, eyes not or scarcely protruding visibly at the sides.

(4) My (few) specimens lack long outstanding flagellate hairs on the head. Humeral flagellate hairs very weak, sometimes missing in roughly handled specimens. Middorsal region of alitrunk with a pair of relatively short flagellate hairs.

(5) Basal gastric costulae less distinct than are those of *clypeata*, the spaces between them feebly and superficially reticulate-striate. Color medium ferrugineous.

Male and female unknown to me. Lectotype and other cotypes in USNM.

Type locality: Holly Springs, Mississippi (L. C. Murphree). One specimen seen from type nest (nidotype).

Two additional workers, from Aberdeen, Mississippi (H. T. Vanderford) were also examined. The colony from the type locality was said by Smith to number 75 to 100 workers and a number of dealate queens. It is regrettable that the queen remains undescribed under these circumstances, particularly as it is so desirable to have the sexual forms described from the type nest in order to avoid later confusion. One of these females should be fixed as gynotype, if possible without further delay.

The worker of *rohweri* is very distinctive in appearance, and of all the true *Smithistruma*, it approaches *Weberistruma* most closely. I do not know how much this resemblance is due to convergence and how much to true relationship.

SMITHISTRUMA (SMITHISTRUMA) CLYPEATA (Roger)

Pl. II, fig. 16

Strumigenys clypeata Roger, 1863, Berlin. Ent. Zeitschr. 7:213, worker. *Strumigenys clypeata* Mayr, 1887, Verh. Zool.-bot. Ges. Wien 37:571, worker; Emery, 1890, Bull. Soc. Ent. Ital. 22:Pl. 8, fig. 3, worker; 1895, Zool. Jahrb. Syst. 8:328, Pl. 8, figs. 21, 22, worker, female, male; Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24:148, in key. *Strumigenys (Cephaloxys) clypeata* Emery, 1922, Gen. Ins. Fasc. 174:325; M. R. Smith, 1931, Ann. Ent. Soc. Amer. 24:699-700, Pl. 3, fig. 9, worker; L. and R. Wesson, 1939, Psyche 46:93-94 (biology), 109, in key. *Strumigenys (Trichoscapa) clypeata* M. R. Smith, 1947, Amer. Midl. Nat. 37:587.

Worker: TL 2.16-2.52, HL 0.58-0.62, WL 0.58-0.65, CI 65-67, MI 17-20. Measurements made on 30 workers, including the size extremes from a much larger series from the localities listed; type not seen.

This species has been described fairly well and figured several times in the literature. It is the most common species in its group, among which it may be distinguished by the following characters:

(1) Clypeus very broadly rounded, under liquid the anterior border straight and transverse or nearly so in the center. Surface of disc weakly convex, sometimes with a very feeble impression behind the middle. Surface nearly smooth, definitely shining when clean, covered with a dense, subappressed oval-spatulate pilosity. Hairs fringing free border 13-16 on each side of the center, linear-spatulate, 2-4 times as long as those on the disc and projecting anteriorly from the border with slight curvature toward the midline. Clypeal hairs in Smith's figure (1931, Pl. 3, fig. 9) too small.

(2) Eyes usually if not always slightly but distinctly projecting at the sides of the head, dorsal view.

(3) Pilosity of upper dorsum of head mostly filiform, those nearest the clypeus

slightly flattened, but never so much as in *rohweri*. Long weak flagellate hairs, bilaterally paired, 2 or 3 pairs on the lateral borders of the occipital lobes, the posteriormost pair not arising so far to the sides; humeral pair and up to 3 or 4 other pairs on the alitrunk dorsum; nodes with a few (shorter) and gaster with a sparse growth of very long ones.

(4) Gastric costulae 22-28, distinct, occupying about $\frac{1}{4}$ the basal tergite. Color medium to dark ferrugineous, head often a bit darker than rest.

Female: TL 2.63-2.72, HL 0.63-0.64, CI 68-69, MI 17-18, from 3 females, Illinois and Florida.

Male: TL 2.56-2.62, HL 0.51-0.52, WL 0.80-0.81, greatest diameter of eye 0.20, CI 75, full length of mandible 0.15.

Eyes very convex, placed far forward, distant by about $\frac{1}{10}$ their greatest diameters from the mandibular insertions. Mandibles slender and acute, tips meeting at full closure; apical border concave, edentate, apicobasal angle replaced by a gentle convexity. Notauli and parapsidal furrows present but weak. Mesonotum not longitudinally rugulose or striate, but with a faint median longitudinal furrow. Propodeal teeth low, obtusely subangulate, continued ventrally as low carinae. Body hairs fine, longer and more abundant than in *talpa* or *pulchella* males; two long flagellate hairs on each side of the head behind the eyes. Petiolar node a little larger than in *talpa* or *pulchella*; spongiform appendages represented by very fine white, reticulate cariniform vestiges. Surfaces of nodes fairly strongly shining, with feeble vestiges of the sculpture visible under proper light. Coloration as in *talpa*.

Forewing L ca. 2.25. Venation even more reduced than in *pulchella*, only R + Sc, stigma and 2r defined, and these with only feeble straw-colored pigmentation. Volsella similar to that of *talpa*, but digitus more weakly constricted.

Roger's original worker types are in the collection bearing his name and also in several other European collections. The types of the male and female castes in Emery Coll. No types were seen for the present work.

Type locality: Louisiana (Collection usually credited to Roger).

MATERIAL EXAMINED

ALABAMA: Holt, Tuscaloosa Co., under large stone on hillside (B. Valentine).

FLORIDA: Pasco Co. (P. J. Schmitt).

ILLINOIS: near Quincy (C. C. Hoff); dealate female, Havana, rotten log in woods, Nov. 9, 1943 (H. H. Ross and M. W. Sanderson).

NEW JERSEY: pine barrens in s. part of state (L. G. Wesson).

NORTH CAROLINA: Fayetteville; Raleigh; Berlese funnel (D. L. Wray).

OHIO: vicinity of Jackson (L. and R. Wesson).

PENNSYLVANIA: Beatty [near Latrobe] (P. J. Schmitt).

TENNESSEE: University Farms, Knoxville (D. W. Pfitzer).

This species ranges much as do several other species in the Nearctic fauna, its probable northern limits being in Long Island, southern Pennsylvania and west at least to central Illinois. From this region, it ranges south to Florida and Louisiana at least as far west as the Mississippi Delta. It is nowhere as common as species like *ornata* and *talpa* in the same range. Abundant records show that it will nest in the soil cover, beneath stones, or in rotten logs, usually in forested areas. It has not yet been directly reported as feeding on springtails, but almost certainly does so.

Damaged specimens, especially those with the clypeal and upper cephalic pilosity disturbed, are apt to be confused with *pilinis*. The record from New Jersey, mentioned above, is such a case and is considered somewhat doubtfully determined.

SMITHISTRUMA (SMITHISTRUMA) BREVISSETOSA (M. R. Smith)

Strumigenys (*Cephaloxys*) *clypeata* var. *brevisetosa* M. R. Smith, 1933, Ann. Ent. Soc. Amer. 28:215-216, worker. *Strumigenys* (*Cephaloxys*) *brevisetosa* L. and R. Wesson, 1939, Psyche 46:108, worker, in key. *Strumigenys* (*Trichoscapha*) *clypeata* var. *brevisetosa* M. R. Smith, 1947, Amer. Midl. Nat. 37:587.

Worker: I have seen the type and several more recently collected specimens of this species which leads me to believe that it will eventually be synonymized with *pilinis*. The total length given by Smith for the original specimen is 1.3 to 1.5 mm., but my own hasty measurement shows that HL is about 0.60, CI 67 and MI 20, while the TL

is not more than ± 0.15 from 2.00 mm. Other specimens referable to this species show measurements and proportions entirely within the range of variation of both *clypeata* and *pilinis*, with the HL in the majority of specimens at 0.60-0.61.

Brevisetosa is supposed to differ from *pilinis* in having shorter clypeal pilosity and a more evenly rounded anterior clypeal border; the clypeal surface is moderately to fairly strongly shining, and there seem to be fewer hairs in the total cephalic pilosity. In the type specimen, the hairs seem to me to be slightly less abundant than in most *pilinis* specimens I have seen, but this is a character subject to variation and also to change in aspect due to rubbing of the pilosity before or after collection.

The clypeal pilosity does not appear to be significantly shorter nor outside the normal range of variation so far as apical enlargement of the individual hairs is concerned when considered against a large series of *pilinis* specimens. *Pilinis* specimens from the District of Columbia, Pennsylvania and Ohio seem to have more opaque clypeal surfaces than do southern specimens referred here to *brevisetosa*, and the difference in wideness of the rounding of the free clypeal border, while elusive, may hold taxonomic significance. The very meagre and unsatisfactory material presently available for both forms is inconclusive, but each new collection seems to bring them closer together. Two alternatives are possible: *brevisetosa* is a separate species or, less probably, a southern race of *pilinis*, or else it is an absolute synonym of a species known to be very variable, bearing the name *pilinis*. I favor the latter view, but cannot presently prove it to be true. I therefore leave *brevisetosa* as a provisional species until the time when a reviser of the group with more material at hand can make a sounder decision. The definitely shining clypeus with its very broadly rounded border and the seemingly slightly sparser pilosity, are the only characters I can see at present to separate *brevisetosa* from its ally.

Gynotype female, dealate: I reluctantly, in view of the shakiness of this species, designate a specimen from the Bryce Lake, Alabama nest (see below) as gynotype. This specimen, to be placed in the MCZ by the collector, is very much like the females of *pilinis* I have seen, but differs in the same way as do the workers of the two species. The color is very dark; mesonotum approaching black and gaster deep castaneous.

MATERIAL EXAMINED

Holotype worker, a unique [USNM]. Type locality: Lucedale, Mississippi (H. Dietrich); taken while sifting for beetles.

Small series of workers and one female (gynotype). Bryce Lake, Tuscaloosa Co., Alabama (E. O. Wilson). "In cavity of a portion of a very rotten pine limb partly sunken in the earth and covered with leaf litter and tangled vines."

A single worker from a leaf mould Berlese funnel sample, Williamston, North Carolina (D. L. Wray); damaged, pilosity largely gone, det. *brevisetosa* by M. R. Smith, and this interpretation followed here, though this specimen is doubtfully named at best.

Mr. Wilson has observed *brevisetosa* in the laboratory. He has undoubtedly made some interesting observations on the feeding habits to be published in due course.

SMITHISTRUMA (SMITHISTRUMA) PILINIS (Forel)

Strumigenys clypeata var. *pilinis* Forel, Ann. Ent. Soc. Belg. 45:339, worker. *Strumigenys* (*Cephaloxys*) *clypeata* var. *pilinis* Emery, 1922, Gen. Ins. Fasc. 174:325; M. R. Smith, 1947, Amer. Midl. Nat. 37:587. 1931, Ann. ESA 4:780, pl. 3, f. 12. *Strumigenys* (*Cephaloxys*) *pilinis* L. and R. Wesson, 1939, Psyche 46:109, worker, in key. *Strumigenys* (*Cephaloxys*) *medialis* L. and R. Wesson, 1939, Psyche 46:94-95, Pl. 3, fig. 1, worker, female. (New syn.). *Strumigenys* (*Trichoscapa*) *medialis* M. R. Smith, 1947, Amer. Midl. Nat. 37:587. *Strumigenys* (*Trichoscapa*) *clypeata* var. *pilinis* M. R. Smith, 1947, Amer. Midl. Nat. 37:587.

Worker: Principal dimensions entirely within the range of variation of *S. clypeata*, except that one specimen showed a CI of 64. Differing from *clypeata* in having a very slightly more narrowly rounded free clypeal border in most specimens and in the narrower, longer pilosity. The clypeal hairs are short, apically enlarged and obliquely suberect on the center of the disc, while those fringing the free border are longer, slender and feebly enlarged or merely truncated apically. The hairs on the margin are usually curved ventrally and somewhat medially, but in specimens from two east-central Illinois localities (Urbana, Danville, see below) the hairs are curved feebly away from the midline as in *laevinis*. The clypeal surface is very feebly shining to almost completely

opaque, but the clypeal opacity depending to at least some extent on the freedom from grease, dirt or what seems in most dacetines to be a film of some hardened secretion. Specimens from southern Ohio (*medialis* cotypes) seem to have the most opaque clypeal surfaces, but in any case the difference is a very slight one of very doubtful significance in so variable a species as *pilinis*. The Wessons originally described *medialis* on the basis of supposed differences in pilosity from *pilinis*, but in this, they were misled by Smith's 1931 figure of the latter species (loc. cit.), which shows the clypeal hairs as very fine, including those of the center of the disc. The specimens from which this drawing was made (Washington, D. C., collected by Pergande; see below) have the clypeal pilosity definitely but slightly broadened apically. Forel says "not or slightly" enlarged in the original description, which was also from a specimen taken near Washington. Comparison was made between one of Pergande's specimens and the types of *medialis*, and Dr. L. G. Wesson seems perfectly satisfied that the only difference between these specimens that might be cited is the slight difference in degree of clypeal opacity. As I have stated above, I do not consider the difference sufficient to allow *medialis* to stand.

Female: TL 2.64-2.71, HL 0.62-0.65, WL 0.67-0.69, CI 67-69, MI 17-20. Described from 3 dealate females from Illinois (female from Herod designated here as *gynetype*; see below) Pennsylvania and Ohio.

Male unknown. Holotype in Forel Coll., gynetype in INHS. Types of *medialis* in MCZ, USNM and other American collections. Holotype of *pilinis* not examined.

Type locality: Bank of Potomac near Washington, D. C. (A. Forel).

MATERIAL EXAMINED

DISTRICT OF COLUMBIA: College Hill, Georgetown, Washington (T. Pergande), a small series of workers, apparently from a single nest. [USNM, MCZ].

ILLINOIS: Herod, single dealate female from soil cover in woods, Feb. 2, 1934 (Frison and Mohr), *gynetype*; Danville, 1 worker, base of rotten stump (J. Alsterlund) [INHS]; Urbana, 2 workers, March 25, 1911 (M. C. Tanquary) [MCZ]. Karber's Ridge (Sanderson and Stannard) [INHS, etc.]

OHIO: Beaver, Pike Co., Ohio, several workers and female from nest of about 30 workers and several dealate females in rotten log (L. and R. Wesson), types of *medialis*; also several workers seen from another nest taken in the vicinity of Jackson by the Wessons.

PENNSYLVANIA: Beatty (near Latrobe), a worker and a female (P. J. Schmitt, deposited in MCZ).

From the meagre records, *pilinis* would seem to have a more northerly distribution than *brevisetosa*. This, of course, depends upon the very questionable distinctness of the latter species. *Pilinis* will nest under stones, in the soil cover, or in logs. It feeds on springtails; details of biology are given by the Wessons with the *medialis* description, indicating that it is a very sluggish hunter.

SMITHISTRUMA (SMITHISTRUMA) LAEVINASIS (M. R. Smith)

Text-fig. 6

Strumigenys (*Cephaloxys*) *clypeata* var. *laevinasis* M. R. Smith, 1931, Ann. Ent. Soc. Amer. 24:701, Pl. 3, fig. 11, worker. *Strumigenys* (*Cephaloxys*) *clypeata* var. *laevinasis* L. and R. Wesson, 1939, Psyche 46:109, worker, in key. *Strumigenys* (*Trichoscapa*) *clypeata* var. *laevinasis* M. R. Smith, 1947, Amer. Midl. Nat. 37:587.

Worker: Dimensions as in *clypeata*, except that CI is slightly greater in average (66-68), and the mandibles are perhaps a trifle larger in average (MI 17-21). Measurements based on the type in the USNM and 14 other workers representing 5 colonies from Illinois and Tennessee.

In pilosity and narrowness of rounding of the free clypeal border, *laevinasis* represents the opposite extreme from *rohweri* and the next step beyond *pilinis*. The clypeus is narrowly rounded anteriorly, with a usually more or less definitely shining, yellowish surface. The pilosity is very fine, filiform and tapered apically, the hairs in the center of the clypeus about as long as those along the border, and with the latter mostly curved weakly obliquely away from the midline. The hairs on the rest of the body are proportionately fine, and the paired and other flagelliform hairs in special positions are extraordinarily long, fine and crooked. Anterior border of postpetiolar disc with a row of fine, short longitudinal costulae.

Gynetype female: TL 2.73, HL 0.64, WL 0.70, CI 69, MI 18, forewing L ca. 2.35. Anterior scutum perforated by a short and narrow but very deep, conspicuous pit, much stronger than the furrow found in the same position in some other dacetine species. This might be considered an abnormality, were it not that another female from the same nest has an exactly similar pit. The constancy of this character should be investigated in other nest series, since it appears to be very distinctive. Longitudinal rugulae distinct only in the middle of the scutum. Hairs on mesonotum and rest of dorsum of body long, fine and rather abundant. Ferrugineous; ocellar area infuscated. Gynetype [MCZ] described from an alate specimen, one of two sent me, University Farm, Knoxville, Tennessee, Aug. 14, 1947 (D. W. Pfitzer).

Male unknown. Types in USNM and Mississippi A. and M. College. These specimens were originally designated as cotypes; the specimen in the type drawer in the USNM is here designated as *lectotype*.

MATERIAL EXAMINED

Type locality: Louisville, Mississippi, from cavity in well-rotted log, densely wooded ravine (M. R. Smith); lectotype seen.

ILLINOIS: Valmeyer, forest debris (Smith and Stannard); near Collinsville, 1 female, ground cover, Feb. 9, 1944 (T. H. Frison); Siloam Springs, Brown Co. (C. C. Hoff). These localities in south and western part of the state along the Mississippi River.

TENNESSEE: Tellico River, Monroe Co., colony under bark of white pine log (J. W. Jones, Jr.); University Farm, Knoxville, large colony in small rotten log, with winged females (gynetype here) (D. W. Pfitzer).

VIRGINIA: M. R. Smith reports a collection from Hillsboro in the northern part of the state (J. C. Bridwell); I have not seen any specimens from this locality.

The records indicate a tendency to nest in rotten logs, but the records are still so few that no generalization may yet be safely made concerning nesting habits. The range of *laevinasis*, its clypeal pilosity, and the odd pit of the female scutum seem to indicate that the opinions expressed privately to me by several North American specialists that *laevinasis* is a subspecies of *pilinasis* are incorrect. More material will be needed to establish definitely its taxonomic position.

BIMARGINATA GROUP

With two species, *bimarginata* and *flirrhina*, both very rare. Related to the *clypeata* group, but also with some similarities to the *ornata* group. Head narrow, cuneiform; clypeus rather small, with a rounded free border quite distinctly separated into dorsal (cultrate) and ventral margins. Surface of clypeus more or less concave or depressed, distinctly shining and sparsely tuberculate. Clypeal hairs relatively few in number, rather fine, with a distinct tendency toward curving away from the midline. Rest of body much as in *clypeata*, usually with long paired flagellate hairs present. Size and proportions of body much as in *clypeata* group, except that the mandibles are slightly longer. Basal tooth of mandible acute, visible in front of anterior clypeal border at full closure; diastema definitely larger and more distinct than in the *clypeata* group, at least as long as the length of the basal tooth, and fully visible at closure.

The two very rare species apparently live in the soil cover, but the biology cannot be certainly worked out until more records come to light. So far as is known, the group is restricted to the eastern half of the United States.

SMITHISTRUMA (SMITHISTRUMA) BIMARGINATA (L. and R. Wesson)

Strumigenys (*Cephaloxys*) *bimarginata* L. and R. Wesson, 1939, *Psyche* 46:95-97, Pl. 3, fig. 2, worker, female. *Strumigenys* (*Trichoscapa*) *bimarginata* M. R. Smith, 1947, *Amer. Midl. Nat.* 37:587.

Worker: TL 2.21-2.39, HL 0.60-0.61, CI 63-67, MI 18-22. (Description and measurements from the holotype and one additional worker from Illinois.) The two margins

of the free clypeal border are very distinct, the upper one concentric and slightly within the lower one as seen from dorsal view. The two margins are separated by a distinct round-bottomed groove traversing the entire free border from one lateral clypeal angle to the other. Clypeal hairs fewer than in *pilinosus* or *brevisetosus*, but more than in *ornatus*, the longest ones more than 1/3 the maximum width of the clypeus in length, outstanding, and curved weakly ventrally and more or less away from the midline, concentrated along the free border. These longer hairs are very fine, but have a slight, rather sudden apical enlargement, under very high magnification appearing weakly bifid or somewhat feebly fishtail-shaped. Hairs on the center of the clypeus very few, seemingly absent in one fair-sized area just posterior to the exact center, short, erect, not or almost imperceptibly enlarged at apices. Hairs on the upper dorsum of head densely arranged, abundant, quite uniform in size, form and orientation, long, erect, their apical halves curved strongly anteriorly and slightly mesad, their extreme apices weakly but suddenly broadened in much the same way as are the larger clypeal hairs.

The apical series of teeth on the mandible seems a bit more uniform than in the *clypeatus* group as regards length of the individual teeth, but tooth no. 3 still appears slightly the longest. Alitrunkal hairs sparse and long, very slightly or not apically enlarged, also a few very long flagellate hairs here and on the nodes and gastric dorsum, the latter extremely long, mostly longer than the petiolar peduncle, curved posterodorsad.

A very distinct median curinula reaching from the anterior pronotal margin to the middle of the propodeal dorsum, and the posterior dorsum of the pronotum obscurely longitudinally rugulose or striate; ground sculpture of entire alitrunk dorsum moderately coarsely reticulate-punctate. Postpetiolar dorsum, gastric surface and sides of alitrunk largely smooth and shining; gaster with short basal costulae.

Female (description from gynetype; see below): TL 2.71, HL 0.62, WL 0.66, CI 61, MI 21. Dorsum of alitrunk with a rather dense growth of fine, whitish subrecalcinate hairs and five or so pairs of long, weak, arching flagelliform hairs. Petiolar node with at angular summit in profile, its posterodorsal face with dense pilosity as described for the alitrunk. A few distinct longitudinal costulae, well spaced and parallel, on scutum and scutellum. Color, including vertex, medium ferruginous; gaster mahogany.

Male unknown. Worker (*holotype*) and female (*gynetype*) in MCZ; the designation of types has hitherto not been quite clear, but the description is that of the worker in the original reference so that this single specimen can be taken as the holotype. Gynetype is fixed by present designation of the original female.

MATERIAL EXAMINED

Type locality: Cedar Mills, Adams Co., Ohio (L. and R. Wesson), the holotype and gynetype, taken close together in thin soil cover in brushy woods, somewhat open, grassy spot.

A single additional worker, taken at Woodlawn, Illinois (L. J. Stannard), included in the above description, has the broader head of the two workers, but is obviously of this very distinct species. Returned to INHS. Two workers belatedly received from INHS: Red Hills State Park, Illinois, *Andropogon* sod (Smith and Stannard).

SMITHISTRUMA (SMITHISTRUMA) FILIRRHINA Brown

Smithistruma (Smithistruma) filirrhina Brown, 1950, Trans. Amer. Ent. Soc. 76:37-38, worker.

Holotype worker: TL 2.17, HL 0.56, WL 0.55, CI 69, MI 22. With the characters of the group. Head a little broader than in *bimarginata*; eyes small and just barely protruding visibly at sides, dorsal view. Alitrunk and rest of body much as in *S. pilinosus*, with same straight profile of posterior dorsum; median carinula strong, ending in an inconspicuous tubercle at the weakly indicated metanotal groove.

Clypeus as broad as or extremely slightly broader than long, free border bimarginate, disc platform-like, concave, or more properly, with a very broad, shallow transverse sulcus centered at the discal midlength. Dorsal free margin cultrate, broadly rounded and somewhat translucent, very feebly scalloped or irregular along part of its edge. Ventral to this margin is a groove running all the way around the free border, and below this is the ventral margin, not so distinctly cultrate as its dorsal companion. In these characters, the clypeus very much like that of *bimarginata*, but a bit more broadly rounded. In the holotype, the only specimen available to me, there is a continuous band of some hardened black substance practically filling the groove of the free border, very even in form and

projecting slightly laterally at each posterior end of the groove just anterior to the lateral clypeal angles. This black material may represent a hardened secretion or some other foreign material, but its evenness and symmetry are such that the possibility of its representing a permanent structure should not be lightly discarded. Clypeus yellowish in color and shining, the tubercles appearing as minute brilliant points and mostly restricted to a narrow belt just inside of and following the free border.

Hairs fringing free border very fine, filiform, extremely slightly or not at all enlarged apically, arranged in a pattern somewhat similar to those of *ornata* and *dietrichi*, though the individual hairs are not so large and conspicuous. Nearly all hairs rising either directly from the dorsal free margin or just inside it, curved more or less away from the midline. Just inside of and posterior to the left lateral corner of the disc, there arises a very long, weak, perpendicularly erect, crooked flagellate hair which is nearly as long as the disc itself. This is apparently paired with a shorter, but similar (broken ?) hair in the same position on the opposite side of the disc. On each side in the same general posterior region of the disc are two or three shorter, but still rather long, weak flagelliform hairs, erect and with their apices curved gently posterolaterally. If the longest hair is normally one of a pair, the correspondence in position and type to the long slender pair of posteromedial vibrissae in *ornata* and *dietrichi* is a possibility. More specimens are needed to aid in the extended definition of the clypeal pilosity.

Pilosity of upper dorsum of head much as in *laevinasis*, very fine, subreclinately arched toward the midline and only moderately abundant. Paired long fine flagellate hairs on the occiput and one hair on each occipital lateral border. Scape hairs 7 or 8, very fine and inconspicuous, slightly enlarged at tips, subreclinate and directed apicad. Alitrunk with very fine hairs, few and mostly reclinate; no outstanding long flagellate hairs, possibly rubbed off. A few long weak hairs on the nodes and on the anterior and posterior gastric dorsum. Basal gastric costulae distinct but fine, extending not more than $1/5$ the length of the basal tergite.

Color medium ferrugineous, basal gastric tergite feebly infuscated.

The holotype, a unique, was taken on December 17, 1946, in a Berlese funnel sample of pine-holly leaf mould from Williamston, North Carolina (D. L. Wray); to be deposited in USNM.

ORNATA GROUP

Two Nearctic species, *ornata* and *dietrichi*; the aberrant Neotropical *hyphata* is also placed here provisionally. This general characterization applies mainly to the two North American forms:

Head more or less cuneiform, the preocular laminae strongly or not at all convergent. Clypeus longer than broad in most specimens, with the anterior free border rounded or forming a blunt raised point. Clypeal hairs very much specialized, the largest ones very long and prominent, arranged principally in a small group radiating from the center of the disc just behind the free border, not or strongly clavate apically. A pair of long, slender, curved vibrissae arising from the midlength of the disc, one on each side; remainder of disc virtually naked.

The anterior end of the clypeus, including the median portion of the free border, is usually raised to some extent, and the disc is consequently feebly convex or saddle-shaped. Form, sculpture and pilosity of remainder of the body not strikingly different from those of other North American species in the common groups.

Mandibles very slender, with a long diastema, longer than the basal tooth; the latter acute, but not as strongly so as in *clypeata*; only 4 principal teeth in the apical series, showing that the closest relationship is probably with the *pulchella* and *talpa* groups.

S. hyphata new species, with a habitus very similar to that of *dietrichi* in many ways, is described with the Neotropical fauna.

Biologically, the two Nearctic species are very interesting, since, though closely related, they seem to have very different nest site preferences. Although both species were considered to be rare twenty years ago, the more recent interest of American entomologists in small cryptobiotic arthropod faunas has brought forth a considerable number of records with accurate and detailed ecological data. These records, while individually insignificant, are most impressive when brought together in showing that *dietrichi* is by strong preference a dweller in rotten logs and under bark of logs and trees, while *ornata* almost invariably nests in the soil cover. The negative evidence is almost as important; Dr. D. L. Wray, an indefatigable collector of Berlese soil samples in North Carolina and very successful in collecting many soil cover dacetines, has not been able to find a single specimen of *dietrichi* among his samples, while he has turned up *ornata* on several occasions. This is not to say that *dietrichi* is never to be found in soil samples, or *ornata* vice versa, for it is entirely possible that these ants often cross the very indefinite borders of their preferred habitats while foraging, or, under unusual circumstances, even in nesting. Nevertheless, the number of records now available is clear in showing great sensitivity in selection of nest sites. The underlying factors, perhaps involving prey-specific preferences, that cause this striking selectivity would make a nice problem in ecology.

Males of the *ornata* group, now unknown, will probably aid in placing the group more accurately in the phylogenetic sequence.

SMITHISTRUMA (SMITHISTRUMA) ORNATA (Mayr)

Text-fig. 7; Pl. I, fig. 2

Strumigenys ornata Mayr, 1887, Verh. Zool.-bot. Ges. Wien 37:571 note, worker. *Strumigenys ornata* Emery, 1890, Bull. Soc. Ent. Ital. 22, Pl. 8, fig. 2, worker; 1895, Zool. Jahrb. Syst. 8:328, Pl. 8, fig. 20, worker; Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24:148 in key, worker. *Strumigenys (Cephaloxys) ornata* Emery, 1922, Gen. Ins. Fasc. 174:325; M. R. Smith, 1931, Ann. Ent. Soc. Amer. 24:695-696, Pl. 2, fig. 5, worker; L. and R. Wesson, 1939, Psyche 46:92-93 ("*ornato*"), biology, p. 109, worker, in key. *Strumigenys (Trichoscapa) ornata* M. R. Smith, 1947, Amer. Midl. Nat. 37:587.

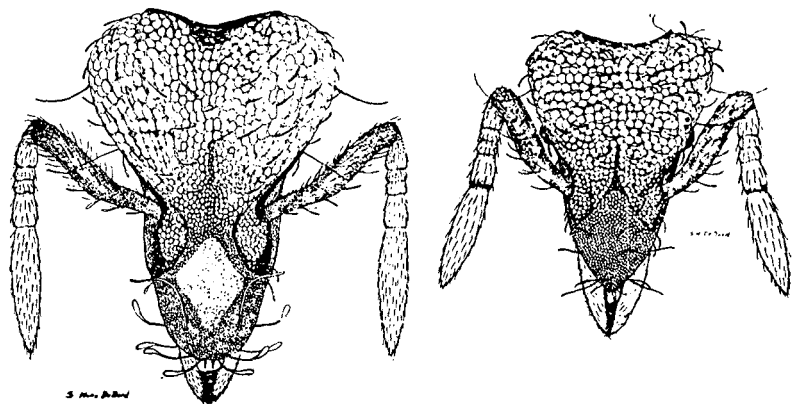
Worker: TL 1.95-2.26 (most specimens 2.00-2.10), HL 0.53-0.60, WL 0.47-0.58, CI 65-68, MI 11-13. This is a well-known and easily recognizable species, likely to be confused only with *S. dietrichi*. In *ornata*, the prominent anterior clypeal hairs have thick, conspicuous bulbous swellings at the apical extremities. Examined by bright transmitted light, these bulbs seem to contain a dark core, which may represent a secretion of some sort in storage. Although there is still no positive evidence for the "lure hypothesis," which I have suggested elsewhere in connection with dacetine feeding upon Collembola, the clypeal pilosity of *ornata* is certainly suggestive to human eyes of a clump of small fungal fruiting bodies. In this connection, it must be mentioned that direct visual stimulus, in view of the reduced optic equipment of the majority of Collembola, is doubtfully effective as any part of a possible lure.

The preocular laminae are usually roughly parallel and more or less convex, and the anterior clypeal border is broadly rounded and distinctly raised. Pronotum with distinct anterior margin, subangulate humeri, and a well developed median carinula extending posteriad across the mesonotum. Promesonotal sulcus not developed; mesonotum with a feeble semicircular subcarinate anterior border. Pronotal sculpture largely effaced, the dorsum as well as the sides usually more or less shining. Metanotal groove only feebly developed, but somewhat enhanced by a weak transverse carinula marking the posterior mesonotal border. Sides of pronotum in most specimens appearing weakly marginate or submarginate. Almost entire sides of alitrunk smooth and shining. Piligerous tubercles of humeri and mesonotum small but distinct. Propodeal teeth acute, slightly elevated.

Lateral border of each occipital lobe with two long, outstanding flagellate hairs; similar paired flagelliform hairs arising from the humeral tubercles and mesonotal tubercles, and also a pair nearer the center of the pronotal dorsum. Hairs of nodes and gastric dorsum moderately abundant, only moderately long, most often not flagellate and appearing truncate at apices.

Color usually medium ferruginous, but lighter or considerably darker individuals are not uncommon.

Gynotype female, dealate: TL 2.42, HL 0.61, WL 0.64, CI 67, MI 11. Differing from the worker in the usual attributes of full sexuality. Pronotum with distinct, though blunt, humeral angles. Scutum with a feeble anteromedian impression, also with a distinct median longitudinal carinula and some feeble longitudinal striae or costulae on each side of the carinula. Pro- and mesonotal dorsa with rather abundant short fine flagelliform hairs, mostly slanted or curved posteriad. Basal gastric costulae rather coarse, extending nearly half the length of the basal tergite, with faint shagreening interspersed. Color medium ferruginous, ocellar calluses blackened. Described from a single female taken with workers from forest debris south of Fulton, Tennessee, March 30, 1948 (L. J. Stannard); deposited in INHS.



Text figs. 7, 8.—7. (left) *Smithistruma ornata* (Mayr), worker, head in full-face view (after M. R. Smith); 8. (right) *Smithistruma dietrichi* (M. R. Smith), worker, head in full-face view (after M. R. Smith).

Male unknown. Cotypes in Mayr Coll., probably also in other European collections. Specimens in the Schmitt Collection from St. Vincent College are marked "type." Several of these were destroyed en route to me for study. While the latter specimens, taken near Alexandria, Virginia by Pergande, are probably nidotypic, I doubt whether they were even seen by Mayr.

Type locality: "Washington, D. C." (T. Pergande); actual localities probably in Virginia, just across the Potomac River from Washington, for most of the specimens I have seen collected by Pergande were accompanied by a note to this effect.

Localities for material studied, mentioned in part only:

ALABAMA: Tuscaloosa (E. O. Wilson); University (B. D. Valentine). The record from Mobile, Alabama (W. S. Creighton) mentioned by Smith in 1931 is based on a specimen of *dietrichi*.

FLORIDA: Welaka (A. Van Pelt); Perry (H. H. Ross and L. J. Stannard).

GEORGIA: Brunswick (Wilda Ross); Atlanta (H. Hoogstraal).

ILLINOIS: Various localities in the southern half of the state, by members of the Illinois Natural History Survey; northernmost state record is Marshall, Clark Co. (Ross, Gloyd and Stannard).

INDIANA: Evansville (H. S. Dybas); Spring Mill State Park (T. Frison and H. H. Ross).

KENTUCKY: Pine Ridge (P. O. Richter and M. W. Sanderson); Burnside (H. H. Ross and L. J. Stannard).

MARYLAND: Near Lloyds (H. S. Barber).

MISSISSIPPI: Louisville (G. W. Haug).

NORTH CAROLINA: Fayetteville, Statesville, Yanceyville (D. L. Wray); Durham (V. E. Shelford); Belmont (P. J. Schmitt); Asheville (A. P. Jacot).

OHIO: Several collections from Pike Co. (L. and R. Wesson).

This species undoubtedly reaches the New Jersey pine barrens, although it has not yet been collected from there. The abundant ecological notes furnished by the collectors mentioned above indicate that *ornata* is most frequently taken in Berlese funnel samples of forest ground cover. Records in connection with large masses of rotten wood are few and indicate that nests of this sort are near or at the soil cover level, e.g., "under rotten stump" or "at base of rotten stump." The Wessons and others have seen nests in crevices in the soil or under stones, and specimens are frequently found in the nests of other, larger species of ants. Series from Berlese funnel batches frequently come mixed with specimens of other soil-dwelling *Smithistruma*, indicating that the ants probably congregate in areas where prey is concentrated or otherwise present under favorable conditions. Because of the commonness of such mixtures of dacetine species, samples containing several of the ants should always be looked at specimen by specimen so that the rarer species, which may be present only singly, will not be overlooked.

SMITHISTRUMA (SMITHISTRUMA) DIETRICH (M. R. Smith)

Text-fig. 8

Strumigenys (*Cephaloxys*) *dietrichi* M. R. Smith, 1931, Ann. Ent. Soc. Amer. 24:696-697, Pl. 2, fig. 6, worker. *Strumigenys dietrichi* Kennedy and Schramm, 1933, Ann. Ent. Soc. Amer. 26:99-104, figs. 3-14, morphology of worker mouthparts, biology. *Strumigenys* (*Cephaloxys*) *dietrichi* [sic] L. and R. Wesson, Psyche 46:93 (biology) and 108, worker, in key. *Strumigenys* (*Trichoscapa*) *dietrichi* M. R. Smith, 1947, Amer. Midl. Nat. 37:587.

Worker: TL 2.09-2.42 (2.20-2.30), HL 0.55-0.61 (0.57-0.60), WL 0.53-0.60, CI 63-66, MI 13-14. Measurements and description taken from over 100 workers selected from 34 series from Ohio, Illinois, Indiana, Tennessee, Maryland, Alabama, Arkansas, and Florida, including size extremes noticed among total material.

Besides the small average differences in size and proportions as noted above, *dietrichi* differs from the closely related *ornata* in the following qualitative attributes:

(1) Clypeus distinctly diamond-shaped, longer than broad, with anterior border raised and coming to a distinct, more or less apically blunted point; in occasional individuals, the point not so very distinct, but anterior clypeal border at least much more narrowly rounded than in *ornata* or any other species of Nearctic *Smithistruma*.

(2) Head more perfectly cuneiform, the preocular laminae usually distinctly convergent anteriorly and weakly convex, tending to complete a continuous outline from the lateral-occipital border to the mandibular apices. Due to the strong anterior narrowing of the clypeus, a considerable basilateral portion of each of the mandibles is left exposed at full closure.

(3) Clypeal hairs placed similarly to those of *ornata*, but much more nearly filiform, with little or no apical swelling. Hairs on alitrunk more abundant than in *ornata*, particularly the smaller ones; long hairs of gastric dorsum decidedly longer than in *ornata*, distinctly flagelliform and weak, arching to or nearly to the surface.

(4) Form and sculpture of alitrunk much as in *ornata*, except that the dense punctulation of the pronotum is as distinct, including the side pieces, as is that of the head and mesonotum; promesonotal sulcus often feebly developed; some specimens with very feeble subrugulation in a longitudinal direction on the pronotum.

Color ferrugineous, usually in medium shades; gaster a little darker and more brownish, sometimes very deep brown.

Gynotype female, dealate: TL 2.57, HL 0.62, WL 0.67, CI 65, MI 14. Showing the usual full sexual attributes. Mesonotum with a weak anterior pit or depression in the middle; median carinula present; scutum and scutellum both with longitudinal rugulation. Hairs on thoracic dorsum fine, abundant, of moderate length, subreclinate to erect. Dense, very fine silvery appressed hairs on the postpetiolar dorsum, especially toward the sides, more noticeable than in the workers. Basal gastric costulae very coarse, half the length

of the tergite bearing them. Gynotype a solitary taken at Bryce Lake, Tuscaloosa Co., Alabama (E. O. Wilson). Several other females (paragynotypes) seen varied but little from the gynotype, and all were deep ferruginous, with ocellar area blackened and alitruncal dorsum and middle of gaster lightly infuscated.

Male unknown. *Lectotype* (designated from Smith's series of 7 workers, originally called cotypes) fixed as the specimen placed in the tray reserved for holotypes in USNM, fixation present. Other specimens from the original series are presumably in the collection of the Mississippi A. and M. College. Female types are in MCZ and other North American collections.

Type locality: Lucedale, Mississippi (H. Dietrich), in woody frass of logs and stumps.

Distribution and material examined: 34 series and numerous strays of this ant were examined, making a list so voluminous that it is omitted here in a locality-by-locality sense. Localities at the extreme of the range as presently known are cited with collectors: Illinois: numerous collections from rotten logs of all sorts of trees in the vicinity of Urbana and other southern and central portions of the state (personnel of the Illinois Natural History Survey; Orlando Park). Harahan, Louisiana, single female, under bark of willow (F. G. Werner). Washington Co., Arkansas (M. W. Sanderson). Several localities in northern Florida (A. Van Pelt; P. J. Schmitt). "Maryland" (T. Pergande). North of Columbus, Ohio (M. E. Amstutz). Within this large area of the eastern United States, and probably also in the New Jersey pine barrens, *dietrichi* occurs in pretty much the same localities as mentioned under *ornata*, and has been taken by very nearly all the same collectors. A notable hiatus occurs in North Carolina, where Dr. D. L. Wray, an active and very successful collector of dacetines by means of soil cover Berlese funnelling, has so far failed to take this species. Since *dietrichi* almost certainly occurs in North Carolina, the lack of specimens from Dr. Wray merely confirms the high degree of preference shown by this ant for a habitat other than the soil cover.

The majority of records, both in the literature and among those sent to me with specimens, are specific in stating that the ants were taken under the bark of logs, stumps or standing trees, while a lesser number indicate that the actual nest was deeper in the log or stump than the cortical or subcortical layers. *Dietrichi* sometimes occurs in or near nests of other ants.

PULCHELLA GROUP

Three Nearctic species are presently considered valid: *pulchella*, *missouriensis* and *reflexa*. Size rather small, but not so small as previous authors have stated. Head with definitely expanded occipital lobes and parallel or subparallel preocular laminae, so that the cuneiform shape characteristic of the *clypeata* group is lost. Clypeus definitely broader than long and more than half as broad as the head across the occipital lobes, its free border with one visible margin, and this usually more or less bluntly tuberculate, so that it appears shallowly and irregularly scalloped in many specimens. The clypeal disc is more or less impressed or shallowly concave, minutely granulose-punctulate and opaque, with pilosity in the center very much reduced, appressed or subappressed and inconspicuous, often absent altogether. The hairs of the free border proper are few in number, usually 4-6 on each side of the midline; with the exception of one or two minute pairs in the middle of the anterior portion, these hairs well developed, spatulate or spoon-shaped. Usually at least one of the hairs on each side is turned laterally and more or less posteriorly, and in typical *reflexa* specimens, all the free border hairs are so directed. A smaller row of suberect, apically broadened hairs is usually fairly distinctly seen on the disc just inside of and following the free margin.

Mandible short, with an acute basal tooth and a large diastema; four principal teeth in the apical series. Alitrunk much like that of other North Ameri-

can groups. Postpetiole and gaster shining, the latter with distinct basal costulae and some long weak hairs.

The taxonomy of this group is less clear than in any other Nearctic complex except, perhaps, in the *clypeata* group. The species are separated on width of head and mandibles and on relatively minor differences in amount, size, shape and direction of curvature of pilosity, especially that of the clypeus. All would be well were it not that these very attributes are variable to some extent and apt to intergrade in occasional specimens. The most variable species is *missouriensis*, which I here take to include *sculpturata*, but even this variable form has limits separating it fairly well from *pulchella* on the one hand. The two forms *pulchella* and *missouriensis* seem readily distinguishable at a glance, no matter from what locality they stem, even though drawing a formal line in description is a difficult matter involving some rather picayune characters. *Missouriensis* may be said to be intermediate between *pulchella* and *reflexa* in pilosity and in general robustness of build. While *reflexa* series or individuals from most localities are readily identifiable because of the reflexed condition of all the principal hairs fringing the sides of the clypeus, there exists one North Carolina series containing individuals clearly intermediate between *reflexa* and *missouriensis* in the number of hairs reflexed. The separateness as species of these two forms therefore comes into question.

I have tried my best to fit all the specimens conceivably identifiable as *missouriensis*, *reflexa* or Smith's *sculpturata* into some sort of pattern of geographical races or races and species, and at times have seemed to find a successful answer to the problem in this way. Each of the detailed solutions, however, has sooner or later been completely wrecked by specimens sent me by cooperators from such localities that the distributions are shown quite clearly to overlap on so broad a scale that notions of subspeciation for any and all of these forms cannot now be accepted. Because, in all of the known localities but one, *reflexa* stands out and is easily identifiable, I have retained it as a separate species until proper ecological and breeding studies can be made upon living samples. In the case of *sculpturata*, which is not distinctly different from *missouriensis* in the first place, I have as complete a series of gradually intergradient forms from recent new collections as will serve to satisfy anyone that a large percentage of available specimens can be placed as either species with little difficulty. In the face of such intergradation, the only course possible seems to be synonymization of *sculpturata* under *missouriensis*. Collections of the *missouriensis-reflexa* complex accompanied by accurate and detailed breeding data will be needed to help in settling the final details in the taxonomy of the forms of this group.

Grounds can be found for relating the *pulchella* group to almost every other group occurring in its region, but among these, linkage to the *talpa* group, the *ornata* group, and possibly through *abdita* to the subgenus *Wessonistruma* appears strong on the basis of the reduction to 4 of the number of principal teeth in the apical series. On the other hand, similarity in head form to the *rostrata* group is marked, and probably indicates a relationship through partially diastemate forms like *bunki*.

Pulchella is a common species in the eastern half of the United States, usually nesting in red-rotten logs or the red rotsoil collected in the bases of

hollow trees, though apparently it is also a soil-nester at times. The other two species appear to nest chiefly in the soil, although *missouriensis* will nest in rotten wood, and so few records are known for the latter species that it is perhaps not safe to generalize concerning them.

SMITHISTRUMA (SMITHISTRUMA) PULCHELLA (Emery)

Strumigenys pulchella Emery, 1895, Zool. Jahrb. Syst. 8:327-328, Pl. 8, fig. 19, worker. *Strumigenys pulchella* Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24:148, worker, in key; Kennedy and Schramm, 1933, Ann. Ent. Soc. Amer. 26:95-96, 100, biology. *Strumigenys (Cephaloxys) pulchella* Emery, 1922, Gen. Ins. Fasc. 174:325; M. R. Smith, 1931, Ann. Ent. Soc. Amer. 24:702-704, Pl. 4, fig. 13, worker, biology; L. and R. Wesson, 1939, Psyche 46:100-101, biology; Buren, 1944, Iowa State Col. Jour. Sci. 18:290. *Strumigenys (Trichoscapa) pulchella* M. R. Smith, 1943, Amer. Midl. Nat. 30:307; 1947, Ibid. 37:587. *Smithistruma (Smithistruma) pulchella* Brown, 1948, Trans. Amer. Ent. Soc. p. 104, designation as genotype of *Smithistruma*.

Worker: TL 1.96-2.10. Concerning total length, Emery gives "1 1/2-1 2/3 mm." Smith follows Emery with "1.5-1.66 mm." Out of 400 individual workers from all parts of the known range examined, I was able to find only six individuals measuring under 2.00 mm. Even allowing for differences in method, this great difference in the dimensions for so small an insect points up the necessity for at least a modicum of accuracy in future measurements. HL 0.52-0.61, CI 61-67, MI 12-17.

This species has been amply described in the worker caste by both Emery and Smith; the figure given by Smith (1931) shows the habitus of a typical specimen very well if the too-great thickness of the scapes be ignored. This is a familiar form to most American myrmecologists, and is represented in most European and American collections. The clypeal pilosity varies slightly from one nest to another; in some series, the hairs on the anterior border are all curved more or less toward the midline, or at least, there are none curved definitely away from the midline. In most series, however, one large hair on each side of the anterior border and the one or two very small pairs in the center of the border are laterally curved. The hairs on the disc proper are usually present throughout, but are very inconspicuous and mostly appressed, few in number. The lateral border of each occipital lobe bears a long, fine flagellate hair, curving laterally and dorsally.

Sides of closed mandibles not continuing the outlines of the sides of the clypeus; mandibular diastemata large, sometimes seeming to take up half the visible length of the inner border. The shafts of the mandibles are very small and slender, and only very weakly convex dorsally.

Anterior pronotal border narrowly rounded, without or with very indistinct humeral angles; pronotum without or with weak, incomplete lateral marginulae, but with a more or less distinct median longitudinal carinula continuing back across mesonotum. Mesonotum bounded anteriorly by an indistinct sulcus and laterally by fine cariniform margins continuing along dorsolateral borders of propodeum. Metanotal groove narrow and rather weak. Sculpture of pronotum often partially effaced, subopaque; sides of alitrunk almost completely smooth and shining. Color varying from light to deep ferruginous.

Smith's 1931 description states that the clypeal hairs are "club-like." In my opinion they are curved-spatulate or narrowly spoon-shaped, but not clavate. Specimens from the Gulf States are definitely smaller than those from the northern parts of the range. Alabama and Mississippi specimens usually show HL 0.52-0.56, while series from stations ranging from New Jersey to Illinois most often have HL 0.58-0.61; proportions remain about the same. Series from intermediate points like Virginia and Tennessee show dimensions exactly intermediate and overlapping both northern and southern populations. Study of the material available indicates that variation in size runs according to a gradual north-south cline. Since there is at least some evidence (see below) that the related species *reflexa* acts in the same way over the same territory, I am inclined to think that the size variation is more ecological than genetic. Not only does *pulchella* (and some other *Smithistruma* species) get smaller in the extreme South, but it also seems to occur with lesser frequency in Florida and southern Alabama than in states like Illinois, Maryland and Pennsylvania. It may be that the populations along the Gulf Coast are the impoverished outposts of an essentially temperate-climate species now expanding its range.

Gynotype female, dealate: TL 2.50, HL 0.60, WL 0.63, CI 67, MI 15. Except for full sexual characters, much as in the worker. Hairs on anterior clypeal border all curved medially. Longitudinal costulation of scutum distinct and rather coarse. Meso- and metapleura and sides of propodeum smooth and shining. Basal gastric costulae rather coarse, extending $1/3$ or slightly more the length of gastric tergite I. Hairs on dorsum of alitrunk, nodes and gaster very fine, flagellate or subflagellate, rather abundant and mostly slanted or curved posteriad. Color medium ferruginous, ocellar triangle infuscated. *Gynotype* taken singly at Harahan, Jefferson Parish, Louisiana, Nov. 15, 1944 (F. G. Werner); deposited in MCZ.

Paragynotype females from Ohio, Illinois and Pennsylvania: TL 2.45-2.54, HL 0.60-0.62, WL 0.64-0.65, CI 67-68, MI 15. The outward curving of 2, 3 or 4 of the hairs along the free clypeal border is not so common or pronounced in the females as in the majority of worker series, but the females do vary among themselves in this respect. Longitudinal costulation varying in strength and general body color varying in depth.

Allotype male: TL 2.36, HL 0.50, WL 0.76, CI ca. 76, eyes excluded from measurement. Full length of a mandible ca. 0.14 mm. Forewing L ca. 2.7 mm. Mandibles much reduced, smaller and less projecting than under-mouthparts. Much like the same sex of *talpa*, eyes large and strongly convex. Scutum finely and closely longitudinally striate. Posterior sides of alitrunk weakly shagreened and feebly shining, center of kataposternum strongly shining. Propodeal teeth reduced to low obtuse dentiform angles above, subtended by very narrow, whitish carinae below. Petiolar node longer than its peduncle, anterior face very gently sloping, summit rounded above and broader than long, about $4/5$ as broad as the postpetiolar node. Both nodes smooth and shining above, with spongiform appendages arranged as in the worker, but reduced to insignificant whitish cariniform vestiges. Gaster without basal costulae, smooth and shining. Head and anterior alitrunk black or very nearly so, appendages, mandibles and genitalia dull ivory yellow, remainder of body dark castaneous. Forewing venation much reduced, only R + Sc, Rsf₁, Mf₁, stigma, CU + M and 2r defined at all, colored lightly with straw pigment; main branches of M and Rs present only as grooves. *Allotype* (MCZ) taken from a nest with females and workers at White's Gulch near Jackson, Ohio (L. and R. Wesson), no date given. Other males have been seen from Southern Ohio and Tennessee; sculptural and other external details are apparently variable, even within one nest series. The volsellae are like those of *talpa* and *reflexa*. *Allotype* in MCZ; paratype males in various other North American collections.

Type locality: Emery cited Washington, D. C. and Beatty, Pennsylvania as original localities. While the collections were credited to Pergande, I believe that the series from Beatty is properly credited to P. J. Schmitt, in whose collection exist several pins of this ant with Beatty labels and his own name as collector. Schmitt frequently exchanged specimens with Pergande and directly with various European authors. Unless Dr. Creighton has fixed the type locality otherwise, I suggest that Washington, D. C. be selected for this purpose, with Pergande as type collector.

Distribution and other remarks: I have examined over 400 specimens of this ant more or less carefully to gain an idea of the variation in all parts of the range. Represented was material from 51 separate colonies, and numerous single strays were seen as well. Many more hundreds of specimens were identified hurriedly. There are numerous records in the literature accompanied by good data on feeding habits, nesting sites, etc., and investigation is still being carried on by several specialists. There seems to be no point in stating formally the voluminous records. The ant undoubtedly occurs in every state east of the Mississippi and south of a line connecting New York City, Cleveland and Chicago. Wide distribution in wooded areas west of the Mississippi is indicated by the Harahan, Louisiana (F. G. Werner) and Ames, Iowa (W. Buren) records; it probably occurs in many river bottoms extending into the Great Plains.

In Florida, it has been taken at Welaka in the northern part of the state (A. Van Pelt); it is common in red-rotten logs and stumps in southern New Jersey and the Philadelphia area (K. W. Cooper, W. L. Brown); and it must certainly occur farther north along the coast, although the single record from Long Island (see M. R. Smith, 1931, p. 703, and also under *missouriensis* below) is based on a misdetermined specimen of *missouriensis* in Dr. Creighton's collection.

This ant definitely seems to prefer to nest in large masses of rotten wood, and although it will on occasion nest in the ground, I suspect that it does so chiefly in areas in which

the normal and original supply of rotting logs has been removed by human activities. It is a feeder on collembolans, and is a relatively inactive huntress. The best summary of its biology published to date is that of the Wessons, cited in the synonymy.

SMITHISTRUMA (SMITHISTRUMA) MISSOURIENSIS (M. R. Smith)

Text-fig. 9, Pl. I, fig. 7

Strumigenys (*Cephaloxys*) *missouriensis* M. R. Smith, 1931, Ann. Ent. Soc. Amer. 24:701-702, Pl. 4, fig. 14, worker. *Strumigenys* (*Cephaloxys*) *missouriensis* L. and R. Wesson, 1939, Psyche 46:101 (variation, biology), p. 111, in key. *Strumigenys* (*Cephaloxys*) *sculpturata* M. R. Smith, 1931, Ann. Ent. Soc. Amer. 24:706, Pl. 4, fig. 15, worker; L. and R. Wesson, 1939, Psyche 46:110, in key. (new syn.) *Strumigenys* (*Trichoscapa*) *missouriensis* (and *sculpturata*) M. R. Smith, 1947, Amer. Midl. Nat. 37:587.

Worker: TL approximately as in *pulchella*; HL 0.54-0.61, CI 67-72, MI 13-18. Measurements from 42 specimens representing at least 12 different colonies, including the type series and specimens from all the localities listed below.

Close to and resembling *pulchella*, but the head and mandibles broader and the mandibular diastema often less distinct. Differences in general form and pilosity of the head are well illustrated in Smith's 1931 revision in his Plate 4, where *pulchella* is represented by fig. 13, and what I consider to be *missouriensis* by his figures 14 and 15. With Dr. Smith's kind aid, I have used the figure of the *missouriensis* cotype in this work (my text-fig. 9). In using Smith's figures, allowances must be made for certain discrepancies in the thickness of the antennae and in the mandibular dentition shown in insets.

The center of the clypeal disc has a rather large space totally without hairs, or with hairs so reduced that they are invisible at magnifications of 175 \times in good light. There are usually one or two rows of small spoon-shaped hairs, suberect and rather inconspicuous, situated on the disc just inside the free border; these are most often directed laterally or even posteriorly. There is great variation both within and between different nests as regards the number and degree of development of both the intramarginal and marginal hairs, and this variation extends to the shape of the clypeus, which may be broadly and rather smoothly rounded anteriorly or rather irregularly and bluntly scalloped with a subtruncate or truncate anterior border. All degrees of intergradation can be found to link the extremes. There is also variation of very slight degree in the convexity and robustness of the mandibles, but differences here are often illusory and are affected by the completeness of mandibular closure. The relative breadth of the head varies slightly and is intermediate between the breadths of *pulchella* and *reflexa*, but I have found no significant differences between CI's of specimens from Smith's original series of *missouriensis* and *sculpturata* in this respect.

Upper dorsum of head more or less distinctly tuberculate, the tubercles bearing more or less stiff, erect hairs with blunt tips; lateral occipital hairs never so long and finely tapered as in *pulchella*.

The alitrunk is perhaps slightly more robust than is that of *pulchella* and has more definite humeral angles and usually more distinct dorsolateral pronotal margins. Most hairs of the alitrunk show a tendency toward apical truncation or extremely weak clavation.

Female: Dr. Smith did not describe the females he stated to be present in the type nest. The statement that they were winged, coupled with the definite knowledge that they were taken in the same nest as the type workers and were stated by Smith to be of the same species, should in this case be accepted as the original female description for purposes of type fixation. It is desirable to have the gynotype, where found in the same nest as the worker type, designated with its colony so as to prevent possible confusion at a later date. The specimens mentioned by Smith will have to be considered *cogyne-types* until a definite specimen is picked to represent this caste.

Four female specimens, all dealate, from Pike Co., Ohio; Harmony, North Carolina and Black Pond, Virginia: TL 2.47-2.58, HL 0.61-0.62, WL 0.64-0.66, CI 71-75, MI 14-17. Similar to the worker cotypes of *missouriensis*, showing the usual full sexual differences. Posterior half of scutum flat, with a few separated longitudinal rugulae. Erect alitrunkal hairs fine, but with very feebly clavate or at least truncate tips. Color medium ferruginous.

Male unknown, probably similar to that of *pulchella*

Material examined: I have listed the specimens known previously in one list and the specimens upon which new records are based in a second. After the collector's name in the case of previously known specimens, I have given the previous determination placed upon the specimens, and the author and date of citation. All of the localities listed represent examinations of at least one example by the present author. All specimens are considered to belong to *missouriensis*.

Aberdeen, Mississippi (M. R. Smith), *sculpturata* Smith, 1931, cotypes.

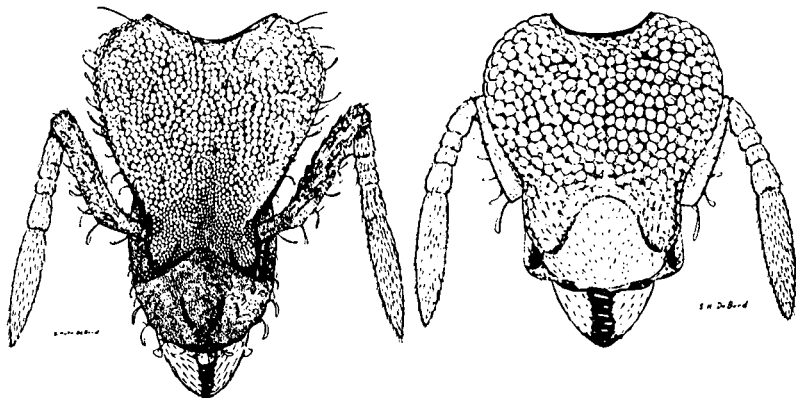
Ripley, Mississippi (S. W. Simmons), *sculpturata* Smith, 1931.

Black Pond, Fairfax Co., Virginia (W. M. Mann), *sculpturata* Smith, 1931.

Columbia, Missouri (Mary Talbot), *missouriensis* Smith, cotypes, type locality.

Pike Co., Ohio, several colonies (L. and R. Wesson), *missouriensis*, L. and R. Wesson, 1939.

Forest Hills, Long Island, New York (L. F. Barnum), *pulchella*, Smith, 1931.



Text figs. 9-10.—9. (left) *Smithistruma missouriensis* (M. R. Smith), worker, head in full-face view (after M. R. Smith); 10. (right) *Trichoscapa membranifera* Emery, worker, head in full-face view after M. S. Smith).

NEW RECORDS

Falls Church, Virginia, in moss (F. André).

Statesville and Harmony, North Carolina, both collections in leaf mould (D. L. Wray).

Collection records of *missouriensis*, while still too few to be conclusive, indicate that it is primarily a soil and soil cover inhabitant. Mary Talbot collected the types in a nest of *Aphaenogaster fulva* under a stone in clay soil. The Wessons found this species abundant in the humus of a cedar thicket in southern Ohio; their work should be referred to for biological notes. Smith states that he collected workers under bark of logs and stumps (*sculpturata* cotypes), although some of the original workers were taken under objects lying on the soil surface. Miss Talbot took winged females from the type colony on August 20, 1929, the usual time of year for winged forms to occur in the nest.

Types of *missouriensis* are on deposit in the USNM and MCZ, and specimens of nearly all the series mentioned are present in the collections of one or both of these institutions.

SMITHISTRUMA (SMITHISTRUMA) REFLEXA (L. and R. Wesson)

Strumigenys (*Cephaloxys*) *reflexa* L. and R. Wesson, 1939, Psyche 46:102-103, 111, Pl. 3, fig. 4, worker description, biology, key. *Strumigenys* (*Trichoscapa*) *reflexa* M. R. Smith, 1943, Amer. Midl. Nat. 30:307; 1947, Ibid. p. 587.

Worker: TL 1.95-2.39 (usually 2.05-2.15), HL 0.52-0.59, WL 0.50-0.58, CI 70-76, MI 16-19, and a strongly nanitic worker from Tuscaloosa, Alabama (E. O. Wilson),

representing the southernmost known record: TL 1.76, HL 0.48, WL 0.46, CI 78, MI 16. The measurements are from 53 workers representing at least 12 separate colonies from Ohio, Illinois, Tennessee, North Carolina and Alabama, including size extremes from among over 250 specimens examined.

Head averaging a bit shorter and broader than that of *missouriensis*, and the anterior clypeal border and verticociput a bit more strongly tuberculate. Center of clypeus bare of hairs, one marginal row of 3 or 4 large, spoon-shaped hairs on each side, all directed posterolaterally; small intra-marginal hairs in one row, also directed posteriorly. Occasional specimens in normal nest series may have one or two of the large marginal hairs curved anteriorly, in this respect making a transition to *missouriensis*. Such specimens come from nests in which most of the workers have the normal *reflexa* pilosity, and have so far been found only in North Carolina and Virginia. Directly dorsal to the antennal insertions, each frontal carina bears on its broadened part a short, broad, reclinate spoon-shaped hair. The hairs on the upper dorsum of the head, arising from the low piligerous tubercles already mentioned, are mostly well spaced, suberect or erect and conspicuous, their apices spoon-shaped or otherwise thickened; posterior occiput with a transverse row of 4 fine, erect bristle-like hairs, the apices of which are very slightly enlarged; a slightly elongate slender spatulate hair on the lateral border of each occipital lobe.

Alitrunk in profile with an obtusely rounded angle formed at the juncture of pronotum and mesonotum; posterior mesonotal area feebly concave; metanotal groove very shallow. The pronotum has distinct anterior and weak dorsolateral margins, but its median carinula is very feeble or absent. Anterior mesonotal border varying in distinctness. Propodeal teeth short, acute, elevated, the infradental carinae broad, with a small excision just below the teeth, but broadly convex ventrally. Dorsum of pronotum usually with punctulation more or less effaced, subopaque or weakly shining. Sides of alitrunk largely smooth and shining. Alitrunk dorsum with a very few small, subreclinate, spatulate ground hairs and some larger, erect paired spatulate hairs, the largest pair on the pronotal dorsum and 4 shorter pairs on the mesonotum, 2 of the latter pairs posterior. A long flagellate or subflagellate hair on each humeral angle, and sometimes the longest hair on each side of the mesonotum is subflagellate, but more often it is erect and stiff. Hairs of nodes and gaster erect, long and slender, but usually truncate or even weakly enlarged at apices. The basal gastric costulae are $\frac{1}{4}$ or a little more the length of the basal tergite. Color usually light to medium yellowish ferrugineous, rarely darker.

Gynotype female, dealate: TL 2.25, HL 0.54, CI 76, MI 18. With the usual differences from the worker. A few oblique rugulae on the occipital lobes. Mesonotum with an extremely feeble median anterior sulcus, a median carinula, and a faint suggestion of longitudinal striation. Gastric costulae coarse, extending about half the length of the basal tergite. Mesonotum with fairly abundant, moderately long, stiff erect hairs, the apices of which are feebly enlarged. Humeri subangulate, with crooked flagelliform hairs. Color yellowish ferrugineous, ocellar calluses blackened.

Gynotype described from a specimen taken at Reelfoot Lake, Tennessee (L. J. Standard), deposited in INHS.

Paragynotype; dealate solitary female collected at Fayetteville, North Carolina, May 8, 1949 (D. L. Wray): TL 2.55, HL 0.59, WL 0.62, CI 72. Color medium ferrugineous.

Allotype male: TL 2.20, HL 0.46, WL 0.68, CI 88. Greatest diameter of eye 0.19 mm., mandible L 0.12, distance from mandibular insertion to anterior border of eye .05 mm. Wings crumpled, but what can be seen of venation is much as in *pulchella*. Mesonotum with a weak anteromedian impression and a median carinula, but not striate; notauli distinct almost to center of V. Humeri bluntly angulate, each with a flagellate hair. Meso- and metapleurae practically completely smooth and shining. Propodeal dorsum with punctulae in fine transverse rows, but not strictly striate. Propodeal teeth reduced but acute, carinae below very weak. Both nodes nearly entirely smooth and shining.

Clypeus with only a few small fine hairs restricted to sides of free margin. Hairs on cephalic dorsum few, small and fine; those anterior to ocelli directed mesoposteriorly, those posterior to ocelli directed forward. Alitrunk with a few fine hairs, most of which are reclinate. Hairs absent or nearly so on nodes and anterior $\frac{1}{4}$ of gastric dorsum. Spongiform appendages of nodes developed only as vestigial cariniform borders. Color

deep ferrugineous; head; dorsum of alitrunk and middle dorsum of gaster slightly infuscated. Volsellae as in *talpa*.

Allotype taken from a colony at Catawba on the Lake Erie Shore of Ohio, August 18, 1938 (Mary Talbot); in MCZ.

MATERIAL EXAMINED

Types taken by L. and R. Wesson at Jackson, Ohio. Holotype and paratype in MCZ, paratypes in USNM and various other collections.

ALABAMA: Hurricane Creek, Tuscaloosa Co., a single nanitic worker (E. O. Wilson).

ILLINOIS: Several localities in the central and southern parts of the state, collections by personnel of the Illinois State Natural History Survey. Northernmost state record is Quincy (C. C. Hoff).

NORTH CAROLINA: Leggetts; Fayetteville (D. L. Wray).

OHIO: (See above for type locality) Beach at Catawba (Mary Talbot).

TENNESSEE: Reelfoot Lake (L. J. Stannard). Holston Mts. in Sullivan Co. (J. W. Jones).

WEST VIRGINIA: Dr. M. R. Smith (*in litt.*) reports specimens from an apple orchard at Kearneysville (H. A. Jaynes); I have not examined these specimens.

Biology: The Wessons observed *reflexa* feeding upon collembolans; according to them, it is a very sluggish huntress. Nesting has been reported from the soil and from under or in objects lying on the soil surface.

Remarks: *Reflexa* appears not to have been taken at the same localities as has *missouriensis*, although the general range of the two forms is approximately the same. This may mean that the two are nothing but local populations of the same species, varying by habitat type. The appearance of *reflexa*, however, with its 3 or 4 heavy back-turned clypeal hairs on each side and its relatively broad head, is so different from that of the usual *missouriensis* worker that the two forms should be regarded as separate until further evidence is in. The only other species that might be mistaken for *reflexa* is *wrayi* new species, but the latter may be distinguished by its *talpa*-like head and the abundant small hairs on the disc of the clypeus.

TALPA GROUP

Four species, *talpa*, *creightoni*, *wrayi* and *filitalpa*, with similar form of head and mandibles. Clypeus weakly convex, free border unimarginate, the disc about as broad as long or very slightly broader than long and about half as broad as the width of the head across the occipital lobes. Occipital lobes slightly expanded, the cephalic index averaging a little greater than in the *clypeata* group. Preocular laminae parallel or weakly converging anteriorly, but never converging as sharply as in the *clypeata* group. While some specimens therefore show a somewhat cuneiform head, close examination will reveal that in the majority of cases the outline of each side is not perfectly continuous from rounding of occipital lobe to apices of closed mandibles. Mandibles depressed, the mandibular index usually less than 20; toothless diastema distinct and as long as or longer than the length of the acute basal tooth. Principal teeth of apical series 4 in number. The best figure for general habitus of head and mandibles is that of *creightoni* given in Smith's 1931 paper, although in this connection it must be remembered that the pilosity differs markedly with the species. In this figure, as in most of the others in the 1931 paper, the antennae are drawn a bit too thick.

The anterior clypeal border seen under liquid is broadly and evenly rounded, and at higher magnifications is seen to bear small tubercles from which the bordering hairs spring. The surface of the clypeal disc is always opaque, though sometimes the small anteromedian tumulus is fairly smooth and shining. The hairs are abundant and distributed over the entire discal surface, though usually shorter in the middle; the hairs fringing the free

border are more numerous and crowded than in the *pulchella* group.

The species of this group show a series of pilosity developments roughly paralleling that of the *clypeata* group, and already several authors have been confused by the similarities between the two species *clypeata* and *talpa*, each respectively the commonest species in its group. It is possible that the new species *filitalpa*, described below, will be confused with *pilinasis* or *laevinasis*; if specimens are in doubt, the mandibular dentition usually furnishes a safe means of identification to group.

The remainder of the body is slender and much as in other Nearctic species of the group in all respects.

The relationships of this group are not with the *clypeata* group. Wesson and Wesson were misled by Weber's statement that *talpa* belonged to the *clypeata* group, and were also thrown off by his habitus figure of the *talpa* head, which does not bear a very good resemblance to the holotype specimen from which it was drawn. Because of this, the synonymous species *venatrix* was described. Dr. L. G. Wesson has recently pointed out this synonymy after seeing the type of *talpa*, and I fully agree with his action in this case. Due to the "intermediate" habitus and pilosity of *talpa* and its relatives, the greatest number of misdeterminations of our North American fauna have involved one or more species of this small assemblage. In earlier phases of my work with the group, specimens which I had trouble identifying because of seeming lack of determinate characters nearly always turned out in the end to be *talpa*.

From the structure of the worker mandibles and of the genitalia and other characters of the male, I take it that the closest relatives of *talpa* are the species of the *pulchella* group. Smith and the Wessons have also indicated this relationship in their papers on the Nearctic fauna.

Talpa itself is a common species in many regions, and is quite definitely a soil or soil cover dweller. Furthermore, the observation of the Wessons that this species prefers open, more or less grassy nest sites has been amply borne out by numerous additional records. The other *talpa* group species are rare, and little is known of their biology, possibly because they are also predominantly dwellers in open grassy places not previously thought to be good areas for collecting dacetines. In reviewing biological records generally for dacetine collections in several genera, I find a surprising number of instances of captures from Berlese funnel samples in rich grass sod far from forested areas.

SMITHISTRUMA (SMITHISTRUMA) TALPA (Weber)

Pl. I, fig. 5; Pl. III, fig. 31

Strumigenys (*Cephaloxys*) *talpa* Weber, 1934, *Psyche* 41:63-65, fig. 1, worker. *Strumigenys* (*Cephaloxys*) *talpa* L. and R. Wesson, 1939, *Psyche* 46:109, worker, in key. *Strumigenys* (*Cephaloxys*) *venatrix* L. and R. Wesson, 1939, *Psyche* 44:103-106, Pl. 3, fig. 5, worker, biology. *Strumigenys* (*Trichoscapa*) *venatrix* M. R. Smith, 1943, *Amer. Midl. Nat.* 30:307; 1947, *Ibid.* 37:587. *Strumigenys* (*Trichoscapa*) *talpa* M. R. Smith, 1947, *Amer. Midl. Nat.* 37:587. *Smithistruma talpa* L. G. Wesson, 1949, *Psyche* 56:21, *venatrix* syn.

Worker: TL 2.01-2.41, HL 0.52-0.61, WL 0.49-0.60, CI 67-72, MI 16-19. 35 specimens measured from at least 20 separate colonies representing all the states listed below, including the holotype and size extremes from among more than 200 individuals

examined. Size of workers averaging slightly greater in Illinois and Ohio than in the Gulf States.

Head with a shallow impression running transversely across the dorsum at the level of the antennal insertions. Head shape in general as described for the group, disagreeing with Weber's figure in that the mandibular external borders do not continue the sides of the head. Mandibles as described for the group; basal lamella with a broad base, but fairly acutely tipped, the diastema following rather shallow, longer than the length of the basal lamella. There are 4 principal teeth in the apical series, of which the second is the longest and the third shortest. Teeth 5, 6 and 7 of the apical series much reduced, scarcely larger than the preapical denticles.

Antennal scapes (L 0.26-0.28) bent obtusely near the basal third, slightly incrassate, thickest just distad of the bend. Funiculus (L 0.38-0.40) with apical segment making up slightly more than half the length.

Alitrunk slender, anterior pronotal margin rather narrowly rounded, humeral tubercles at most very feebly developed. Promesonotal sulcus sometimes present, but weak, the anterior mesonotal border often marked by a very indistinct semicircular carinula. Profile from anterior mesonotum to bases of propodeal teeth approximately straight; metanotal groove very narrow and feebly depressed. Promesonotum with a delicate but distinct median carinula; lateral mesonotal tubercles distinct, low and obtuse. Propodeal teeth delicate, compressed, with strongly acute apices, divergent, usually a bit more than half as long as the distance between centers of bases. Infradental lamellae quickly becoming narrow and concave below the teeth, not or just barely widened at their ventral extremities.

Sculpture of the usual pattern; pronotum evenly and densely punctulate and opaque, often with a faint superimposed suggestion of longitudinal striation; posterior sides of alitrunk largely smooth and shining, postpetiolar disc entirely so. Basal gastric costulae rather coarse, extending $1/3$ or a little more of the length of the basal tergite.

Pilosity rather distinctive. Ground hairs of dorsum of head fine, filiform to subfiliform, some, especially more anteriorly, with feebly enlarged apices, mostly subreclinate and directed mesad. Six to eight hairs similar to those of the head on anterior scape borders, all curved toward the scape apex. Clypeal disc with abundant inconspicuous pilosity consisting of small sublinear-spatulate hairs, mostly subappressed and distributed rather evenly. Free clypeal margin with a fringe of projecting, anteromedially curved, narrow linear-spatulate hairs, 9-12 on each side of the middle of the anterior curve. These hairs are a little broader than as shown in Weber's figure, but not quite so broad as the corresponding hairs in *clypeata*. They are often a trifle wider, with a slight tendency toward a spoon-shaped form, in the slightly smaller-sized series from the far southern part of the United States, but the difference is insignificant and not definitely constant within single nest series. A pair, sometimes two pairs, of long fine flagellate hairs on the posterior occiput, also one of these on each lateral occipital border. Alitrunk with moderately abundant, very fine and mostly subreclinate or reflexed flagelliform ground pilosity; humeral and lateral mesonotal paired flagelliform hairs very long and fine. Nodes and gastric dorsum each with a few long fine flagellate hairs.

Color varying degrees of ferrugineous, usually medium ferrugineous, with faintly darkened gaster.

Gynotype female, alate: TL 2.52, HL 0.60, WL 0.66, CI 67, MI 19. Differing from the worker in the usual full sexual differences. Humeral angles weakly and bluntly developed. Mesonotum with an anterior median depression or sulcus, rather weakly developed in this instance; median carinula and a few longitudinal rugulae also present. Propodeal teeth short, infradental lamella becoming wider below than in worker. Gastric costulae very coarse, extending more than $1/3$ the length of the basal tergite. This individual yellowish ferrugineous, probably not having achieved its full coloration. Forewing about 2.2 mm. in length, with only R + Sc, stigma and 2r distinct, and these without pigmentation; M + Cu and part of Cu 1, and also "basalis" indicated by feeble streaks.

Gynotype described from a winged female, one of several taken in a nest containing workers and males, August 7, 1948, University of Tennessee Farms at Knoxville (D. W. Pfitzer). Eight other female specimens from various parts of the range: TL 2.38-2.55, HL 0.58-0.61, WL 0.60-0.67, CI 67-71, MI 16-19. Southern females tended to follow the workers in being smaller in size. Color light to medium ferrugineous, the ocellar triangle usually slightly infuscated, or sometimes strongly blackened.

Allotype male: TL 2.18, HL 0.49, WL 0.70, CI 77. Full length of a mandible ca. 0.15 mm. Greatest diameter of compound eye about 0.20 mm.; distance from anterior border of compound eye to mandibular insertion ca. .05 mm. Eyes proportionately large, very convex. Mandibles much reduced, slender, their acute tips nearly or exactly meeting at full closure; apical and basal borders only very feebly differentiated by a gentle convexity. Notauli developed anterolaterally only; parapsidal furrows fine but distinct. Scutum and scutellum with a straight distinct median carinula; the fine punctulation of both surfaces arranged in longitudinal rows so as to form striae. Meso- and metapleurae smooth and shining over most of their surfaces, anepisternum posterior and katepisternum ventromedially with feeble, suppressed longitudinal striation. Dorsum of propodeum finely transversely striate. Propodeal teeth reduced to low obtuse angles trailing distinct infradental carinae. Petiolar node subglobose, a little broader than long; both petiolar and postpetiolar nodes smooth and shining above. Spongiform appendages reduced to fine, whitish cariniform and subcariniform vestiges. Anteroventral surface of gaster with a patch of long, fine, whitish reclinate hairs.

Hairs of head fairly numerous, but fine, short and inconspicuous, reclinate or sub-reclinate. Alitrunk, nodes and gastric dorsum with sparse fine reclinate hairs and a few short fine erect hairs. Apex of gaster, especially ventrally, with rather dense covering of short fine simple hairs. Head black, alitrunk blackish-brown; nodes and gaster castaneous; legs, antennae and mandibles ivory yellow. Forewing L 2.25 mm.; venation as in female.

Allotype taken from one of the original nests cited as *venatrix* by the Wessons, Pike Co., Ohio, date unknown, collected by the Wessons.

Six other males from the same colony as the allotype and from the same nest as the gynetype (see above) are rather variable in several respects. TL 2.06-2.31, CI 76-80. One of the Tennessee specimens has a faint anterior sulcus on the mesonotum, the head is deep brown in color, and the mesopleurae are quite distinctly longitudinally striate and opaque to subopaque. Propodeal teeth and carinae varying in development with the individual. In all details, including form of genitalia, this species seems similar to *pulchella* in the male caste.

Material examined: Holotype, a single worker [INHS], *type locality*: Herod, Illinois (T. Frison and H. Ross).

Numerous series and a few strays were examined from the following additional localities:

ALABAMA: Elrod; Tuscaloosa Co. (E. O. Wilson; B. D. Valentine); Chattahoochee State Park, Houston Co. (B. D. Valentine); Mobile (W. S. Creighton).

FLORIDA: Welaka, Putnam Co. (A. Van Pelt).

ILLINOIS: Marshall, in *Andropogon* sod (Ross, Gloyd and Stannard); Alto Pass, Jan. 10, 1946 (H. Ross and B. Burks); Siloam Springs, Brown Co. (C. C. Hoff); Bell Smith Springs (M. Sanderson and L. Stannard); La Rue (Ross and Sanderson) and one or two other localities in the southern part of the state, all by personnel of the Illinois Natural History Survey.

LOUISIANA: In a water-oak bottom near Slidell (W. L. Brown).

NORTH CAROLINA: Williamston; Fayetteville (D. L. Wray).

OHIO: Adams, Lawrence, Pike and Scioto Counties, numerous collections by L. and R. Wesson, originally identified as *venatrix*. The types of *venatrix* [MCZ, USNM, etc.] came from Kitts Hill, southern Lawrence Co.

TENNESSEE: University Farm, Knoxville (D. W. Pfitzer).

This is one of the commonest North American species, and it will probably prove to be even more common as Berlese funnel collecting is extended. It should reach southern New Jersey in the pine barrens, although East Coast collections are few at present. For details of biology, the very full treatment of the Wessons (as *venatrix*) should be referred to. Full ecological data obtained since 1939 bear out these authors in considerable detail. *Talpa* feeds on collembolans in nature; characteristically damaged specimens of *Isotoma viridis* Bourlet and an indeterminate *Entomobrya* (determined by Mr. Kenneth Christianen) were found in one of the Alabama nests referred to above, sent by Mr. Valentine.

SMITHISTRUMA (SMITHISTRUMA) WRAYI Brown

Pl. I, fig. 9

Smithistruma (Smithistruma) wrayi Brown, 1950, Trans. Amer. Ent. Soc. 76:38-39, Pl. 3, fig. 5, worker.

Holotype worker: TL 2.02, HL 0.53, WL 0.50, CI 70, MI 17. Resembling small *talpa* specimens very closely, except in the pilosity, and possibly also in the gastric costulae, which extend clearly more than 1/3 the length of the basal tergite and appear longer and more distinct than in any of the *talpa* workers examined.

Free clypeal border with 4 inverted spoon-shaped hairs on each side, these broader than those of *talpa*, but not so broad as in *reflexa*, directed laterally and somewhat obliquely posteriorly. There are also about 4 very small indistinct hairs at the center of the anterior border, and these also seem to be directed away from the midline. Disc of clypeus granulose-punctulate and opaque, with rather abundant but inconspicuous and finely subspatulate hairs evenly distributed over surface and inclined sharply posteriorly. The hairs of the verticociput seem a bit heavier than those of *talpa*, but the difference in this respect is so slight as to require direct comparison against *talpa* specimens for its appreciation. Color medium ferrugineous, first gastric segment a bit darker and more brownish.

Holotype a unique [MCZ], collected by Dr. D. L. Wray by means of the Berlese funnel from leaf mould at Fayetteville, North Carolina. The species is named for the collector, whose zealous collecting has contributed much to the knowledge of the Nearctic dacetine fauna. The remarkable increase in records of dacetine and other minute, more or less cryptobiotic ants during the last ten years is due chiefly to the Berlese funnel collectors like Dr. Wray and the staff of the Illinois Natural History Survey. These biologists have demonstrated fully that many species of the microgenton remain unknown, even in the eastern United States.

S. wrayi is very distinct from *talpa* by virtue of the fewer, larger backswept hairs on the sides of the free clypeal border. The only species with which *wrayi* might be confused is *reflexa*, but the latter species can easily be distinguished by means of its broader head and distinctly wider clypeus. The clypeal disc of *reflexa* is impressed in the center and has no small hairs except close to the free border; the habitus of the two species is entirely different.

The new species is apparently a form of the *talpa* group paralleling pilosity development in other groups.

SMITHISTRUMA (SMITHISTRUMA) FILITALPA Brown
Pl. I, fig. 8

Smithistruma (Smithistruma) filitalpa Brown, 1950, Trans. Amer. Ent. Soc. 76:39. 40, Pl. 3, fig. 5, worker.

Holotype worker: TL 2.06, HL 0.54, WL 0.52, CI 66, MI 17. Head, clypeus and mandibles like those of very slender *talpa* specimens in general form. Clypeus extremely slightly broader than long, opaque, differing from that of *talpa* in its pilosity, which is slightly longer and more abundant, the individual hairs soft, weak and filiform, not sensibly enlarged at their apices and weakly curved anteromedially. Hair on the center of disc evenly distributed, weakly arched-subreclinate, nearly or quite as long as those on the free border. Hairs on the upper dorsum of the head slightly stouter, more nearly clavate or spatulate and more erect than in *talpa*. Lateral borders of occipital lobes each with two long weak flagelliform hairs.

Pronotum in profile shallowly but distinctly concave, meeting the mesonotum through an obtusely rounded angle. Pronotum very indistinctly longitudinally carinate in the middle, the mesonotum a bit more distinctly so. The feebly depressed portion of the pronotum with sculpture more or less effaced, rather smooth and distinctly shining, as in also the case with the dorsum of the petiolar node. Basal costulae of gaster shorter than is usual in *talpa*, extending 1/4 or less of the length of the tergite bearing them. Color light ferrugineous.

Holotype a unique [USNM]. The label with the specimen stated only that it came from Pike County, Arkansas, collected by W. F. Turner. As with *S. wrayi*, this species is a pilosity variant on the *talpa* pattern, although it does display a few additional sculptural differences that seem at present to be significant. Although these two *talpa* group species are described from single specimens, I do not believe that they can be considered mere extreme variants of *talpa* itself, for I have examined enough *talpa* from enough localities to satisfy myself that this common species varies within very strict limits as regards pilosity. I do not think that these are abnormal specimens, either, since I have seen only one proven case of an abnormal specimen in the whole tribe. While *wrayi* and

filitalpa may be very rare species, it is more probable that they have just not been looked for in the right places. It is suggested that both are possibly grass-sod dwellers best collected with the Berlese funnel.

Filitalpa can easily be separated from the superficially similar species *pilinasis* and *laevinasis* by means of its depressed, clearly diastemate mandibles and its opaque clypeus, as well as by its *talpa*-like form.

SMITHISTRUMA (SMITHISTRUMA) CREIGHTONI (M. R. Smith)

Pl. I, fig. 1

Strumigenys (*Cephaloxys*) *creightoni* M. R. Smith, 1931, Ann. Ent. Soc. Amer. 24:705-706, Pl. 4, fig. 16, worker. *Strumigenys* (*Cephaloxys*) *creightoni* L. and R. Weston, 1939, Psyche 46:110, worker, in key. *Strumigenys* (*Trichoscapa*) *creightoni* M. R. Smith, 1947, Amer. Midl. Nat. 37:587.

Worker: TL 2.17-2.44, HL 0.57-0.61, WL 0.53-0.61, CI 65-67, MI 17-20. Measurements taken from 12 workers from the type colony and one somewhat nanitic worker from the District of Columbia, the smallest measurements given representing the latter specimen.

Head and mandibles as in *talpa*; M. R. Smith gives a good figure of this ant in his 1931 paper. The anterior clypeal border is more nearly transverse in the center than is that of *talpa*; clypeus extremely slightly or not broader than long and not more than half as wide as the width of the head across the occipital lobes. Mandibles with an acutely pointed basal tooth nearly as long as the length of the diastema following it, dentition otherwise as in *talpa*.

Alitrunk feebly depressed; promesonotum gently convex in profile, outline from anterior mesonotum to propodeal teeth straight and virtually uninterrupted, due to the absence or very feeble depression of the metanotal groove. Anterior pronotal margin poorly marked and humeral angles not developed; median pronotal carinula obsolete, but present as a feeble vestige on the mesonotum. Propodeal teeth lamelliform, laterally compressed and acute, continued below by very narrow concave lamellae which are not or only very feebly angularly produced at the ventral extremities. Petiolar node slightly higher, its anterior face sloping a bit more steeply, than in either *talpa* or *bunki*.

Pilosity distinctive. Dorsum of head (and more sparingly the alitrunk) covered with abundant, moderate-sized but rather conspicuous inverted spoon-shaped hairs, sharply bent anteriorly so as to appear nearly subappressed. Hairs on clypeus small, abundant, spatulate and nearly or quite appressed, directed anteriorly. Hairs fringing free clypeal border on each side of the middle 9-11, those in the middle and farthest back on the lateral borders small and narrow, but the 4 or 5 hairs along the rounded anterolateral portions of the border larger and distinctly broadened into narrowly oval blades with subacute apices, all curved medially. The hairs of this clypeal fringe are more numerous and crowded and also slightly smaller than those of *bunki*. Hairs on anterior scape border shorter and broader than those of *bunki*, 2.5 usually turned toward base of scape. No specialized long erect hairs on occipital region or on alitrunk; only the humeral hairs, one on each side, larger and very feebly differentiated from the other spoon-shaped hairs accompanying them, but even these hairs reclinate or nearly so. Dorsal surfaces of nodes and gaster with long, fine flagellate hairs, much as in *talpa*.

Basal gastric costulae 15-21 in number, extending 1/3 or a little more the length of the basal tergite. Color light to medium ferrugineous.

Gynotype female, dealate: TL 2.64, HL 0.64, WL 0.68, CI 70, MI 15. Differing from the worker in the usual full sexual attributes. Mesonotum with a few feeble longitudinal rugulae and covered with rather abundant but well-spaced hairs like those of the head; posteriorly with two short incurved subflagellate hairs. Summit of petiolar node angular in profile, seen from above, the anterior dorsal nodal margin (line of summit) transverse and feebly concave, the lateral corners of the summit prominent and subrectangular. Color as in worker.

Gynotype one of two dealate females taken by Dr. Creighton from the type nest (see below); deposited in MCZ. Male unknown.

Material examined: A cotype worker in USNM; the specimen placed in the type tray is designated as lectotype, fixation present. About 25 additional workers from the type nest, now in the collections of Dr. W. S. Creighton and the MCZ, were also examined. Type locality: Spring Hill, Mobile, Alabama (W. S. Creighton). Also examined

was a single nanitic worker taken at Hamilton Hill, District of Columbia by H. S. Barber. There are no direct observations on the biology known to me. Other identifications of this ant are extremely questionable, since various specialists have confused both *bunki* and *rostrata* with it in the past. All records have been reviewed by either myself or by Dr. M. R. Smith, and neither of us has been able to verify a single additional locality. *Creightoni* seems to be southern in its range, and though the very scanty material is not to be accepted as indicating any final opinion, the nanism of the District of Columbia worker may show that the species becomes depauperate near its northern limit as some other species seem to do in reverse.

As stated above, *creightoni* has been confused with both *rostrata* and *bunki* new species. The differences between this species and *rostrata* are so many and so clear that it does not seem worth while to point them out here, but it must be admitted that the resemblance between *creightoni* and *bunki* is extremely close. I have outlined several differences under *bunki* (see below), and in case of doubt, the number of principal teeth in the mandibular apical series can always be checked for certain placement. If it be remembered that *creightoni* has the general features of the *talpa* group, identification will be made considerably easier.

ROSTRATA GROUP

This is a very widespread group, with unquestionable representatives in the Eastern United States, California and in temperate eastern Asia. Several species of the Ethiopian and Neotropical Regions might also be placed here, but these exotic species are mostly "aberrant" in some respect and are more conveniently placed in other groups for the present.

Species here considered of the group are *rostrata* and *bunki* from the eastern part of North America and *californica* from the West Coast. The latter is very possibly introduced from the Orient. The two Japanese species *incerta* Brown and *rostrataeformis* Brown are described in Part I of this revision (see below under Palearctic species).

Rostrata and allies are characterized by the laterally protruding occipital lobes and the straight, parallel preocular laminae, which give the head a rather blocky, not at all cuneiform appearance seen in full face view. The clypeus is definitely broader than long, its anterior border transverse and with a tendency towards a feeble concavity or emargination of the anterior central portion. As in other species of *Smithistruma*, the hairs in the center of the anterior border are shorter than those immediately on each side on the "antero-lateral corners." In the *rostrata* group, this situation is somewhat more exaggerated due to the more enlarged hairs at the sides of the anterior clypeal border and the fact that the hairs mesad of these become rapidly shorter, the apices of all the hairs on the anterior border outlining a semicircle opening anteriorly. Because of this arrangement, the emargination of the anterior clypeal border is heightened by illusion; sometimes the border will appear concave when in point of fact it is perfectly straight. Creighton's method of applying some fluid with such a refractive index as to cause the hairs to become invisible should be used in gauging the actual shape of the anterior clypeal border in all groups where illusion is suspected.

Rostrata group mandibles are characteristically adiaestemate, or, in the case of *bunki*, with a very small, insignificant diastema shorter than the length of the acute basal lamella. The principal teeth are 5 in number and often rather coarse; in *rostrata* and other species in which the dentition is well known, teeth 6 and 7 are nearly as large and as well developed as the preceding teeth of

the principal series, and are logically included with the latter. Mandibular shafts usually moderately broad and depressed.

In pilosity, the group is not especially distinctive; the majority of the hairs on the head and alitrunk are usually short-spatulate or spoon-shaped and mostly reclinate. Specialized erect hairs may or may not be present on head and alitrunk, according to species; fine erect hairs occur on the postpetiole and gaster. Other characters of body form, sculpture, etc. much as in the other Nearctic groups.

The female is similar to the worker except in the usual characters of full sexuality. The male is known for only one species, *rostrata*, and this is distinctive by virtue of its mandibles, which are strongly serially toothed, approaching the worker in this respect. The volsella is somewhat different from those of some other Nearctic species in having a slender, non-constricted digitus with acute or subacute apex.

Except for *rostrata* and *bunki*, records are so few that little can be said about nest sites, feeding or other biological characteristics. *Rostrata* is very common and nests either in rotten logs or in the soil. It sometimes chooses distinctly dry and exposed situations, and feeds on springtails. *Bunki* seems to prefer to nest in the soil or soil cover, and is apparently limited in distribution to the warmer states of the southeastern United States. *Rostrataeformis* of Japan will nest in rotten stumps, but may not be restricted to such an environment.

The species of this group are distinguished from one another by differences in total body size, shape and proportions of head and mandibles, mandibular dentition, pilosity, etc.

The new species, *bunki*, is interesting in that it appears to form a link between the *rostrata* group and *pulchella*. *Rostrata* also shows signs of relationships to the *schulzi* group through species like *orchibia*, to the *emarginata* group through *incerta*, to certain species in the *alberti* group through *conspersa*, etc. The relation to *conspersa* seems, on a strictly morphological basis, to be fairly close, and I have formerly considered *conspersa* to be a *rostrata* group member. The connections of the group are seemingly so wide that I have considered *rostrata* and allies as being close to the primitive line of *Smithistruma*. It must be pointed out, however, that the resemblances to other groups are largely those of habitus, and that a great deal of detailed morphological investigation remains to be accomplished before many of these relationships can be fully sanctioned. Furthermore, the distribution of the group in eastern Asia and the eastern Nearctic seems to point to a fairly recent passage across the Northern Filter Bridge, while species like *alberti* would seem to have been in the New World for a longer time. There can be no doubt of the very close relationship between the Japanese forms and *rostrata*. The small genus *Miccostruma* of the Ethiopian Region seems to have been derived from a *rostrata*-like ancestor.

SMITHISTRUMA (SMITHISTRUMA) BUNKI Brown

Pl. I, figs. 6, 10

Smithistruma (Smithistruma) bunki Brown, 1950, Trans. Amer. Ent. Soc. 76:41, 42, Pl. 3, figs. 2, 3, worker.

Holotype worker: TL 2.24, HL 0.58, WL 0.55, CI 66, MI 18. Head with bulg-

ing occipital lobes and parallel, very nearly straight preocular laminae; clypeus about 1.2 times as broad as long and considerably more than half as wide as the width across the occipital lobes. The sides of the clypeus gently convex and converging; anterior border broadly transverse and straight; in some views and under liquid, the anterior border showing signs of a very feeble, almost imperceptible concavity. Free clypeal border with a single margin, the sides with moderately prominent scalloping due to the small, blunt piligerous tubercles.

Mandibles each with a basal lamella shaped much as in *creightoni*, the base of this lamella broad and the apex attenuated and acute. Diastema following very small, much shorter than the length of the basal lamella; apical series with 5 principal teeth, of which no. 3 is the largest and nos. 2 and 4 the shortest. Nos. 6 and 7 small; denticles and apical tooth as usual.

Eyes small, with only 13-16 facets. Antennal scape obtusely bent near base, somewhat flattened, thickest at about the proximal third of its length, with a tuberculate angle at the bend anteriorly. Alitrunk much as in *creightoni*; remainder of body as in the majority of Nearctic species. Propodeal teeth short, compressed, acute; infradental lamellae continuing them directly below, decidedly broader than in *creightoni*, not strongly concave, ending ventrally in a convex broadening.

Pilosity approximately intermediate between that of *rostrata* and *creightoni*, most like that of the later species, but the hairs fewer, spaced at greater intervals and slightly larger. Hairs on free clypeal border fewer (7 or 8 on each side of the center), larger, more broadly spatulate and spaced a bit farther apart than in *creightoni*. Small appressed hairs on the almost flat disc of the clypeus forming obscure lines in a radiating pattern. Of the hairs fringing the free border, those at the anterolateral angles are largest; all the hairs of the fringe are curved anteromedially. Hairs on the scape borders linearspatulate, a bit longer than those of *creightoni*, and not so broad; the longest hair, situated at the anterior tuberculate angle of the bend, about as long as the breadth of the scape itself at that point and at least half again as long as the next hair distal to it. Anterior scape hairs 1 and 2 curved laterally; 3 (the largest), 4, 5, 6 curved toward the base of the scape; the last two or so hairs very small, directed apically. In general, the cephalic pilosity numbers about 2/3 to 3/4 as many individual hairs as in *creightoni*. Alitrunk dorsum with sparsely distributed, subreclinate, narrowly squamose hairs; each humerus with a stiff outstanding simple hair (this varies from feebly clavate to flagellate in the paratypes) which is about twice the length of the other hairs on the pronotum. Hairs of nodes and gastric dorsum like those of *creightoni*, but slightly shorter and fewer. Color light ferrugineous.

Holotype [USNM] selected from a small series of workers taken in a pine woods near Landon, Mississippi (A. C. Cole, Jr.).

Paratype workers: TL 1.91-2.14, HL 0.55-0.59, CI 64-69, MI 16-20. Clypeus varying from 1.15 to 1.25 times as broad as long. 26 workers, divided among representatives of five separate nests, including the type nest series and other collections as follows: Slidell, Louisiana, 3 workers taken foraging in the open over moss at the base of a large live oak growing in a luxuriant water oak bottom along the Bayou Liberty (W. L. Brown). Savannah, Georgia, two small nest series, one taken from a hickory nut lying on the ground and the other (containing the gynetype) in a small cavity in the soil, January, 1949 (H. T. Vanderford). Welaka, Putnam Co., Florida, a single worker (A. Van Pelt). Paratypes placed in USNM, MCZ, ANS, Consani Coll., and the collections of Dr. A. C. Cole, Jr., University of Tennessee, and Mr. Arnold Van Pelt, University of Florida Conservation Preserve, Welaka, Florida. The workers agree rather well in size and general form of body. The long paired hairs of the humeri very variable from series to series, not developed at all in some of the Georgia specimens. Infradental lamellae varying slightly in degree of concavity, but never becoming so narrow or deeply excised as in *creightoni*. Hairs fringing free clypeal margin a bit shorter in the Florida specimen than in the other paratype series, but even here the hairs are closer to those of the holotype than to those of *creightoni*. Color rather constant, light to medium ferrugineous. Dentition appearing highly constant in 6 workers dissected from Louisiana, Mississippi and Georgia.

Gynetype female, dealate: TL 2.45, HL 0.60, WL 0.61, CI 69, MI 19. Differing from the worker in much the same way *creightoni* differs from its worker. Humeri rounded, each with a long crooked flagellate hair. Mesonotal surface evenly and densely

punctulate, without traces of longitudinal carinula or rugulation. Petiolar node as in the *creightoni* female, but seen in side view a little lower and not so angular above. Basal costulae of gaster extending nearly half the length of the basal tergite. Color as in workers or very slightly darker.

Gynotype taken from a colony nesting in the soil at Savannah, Georgia, Jan. 15, 1949 (H. T. Vanderford; mentioned under paratypes above) deposited with the holotype. Male unknown.

From the present records, this species seems to be restricted to the extreme southeastern part of the United States. It is apparently a soil and soil cover nester.

This form resembles *creightoni* so closely in outward characters that I was originally very doubtful of its distinctness. The two species are separable on habitus, since *creightoni* has the *talpa* type of head and mandibles, while the head and mandibles of *bunki* are superficially more as in *rostrata*. The larger, fewer fringing hairs of the free clypeal border are characteristic of *bunki*, as is the much smaller, less distinct diastema of the mandibles. In cases of doubt, a mandible should be removed and mounted for examination at higher magnifications; it is believed that the difference in dentition between the two species is constant and highly reliable, although when more specimens of *creightoni* become available, the variability of the dentition in various series should be checked.

Despite the very close resemblance between the two species, it appears that the points of similarity are parallel developments in the representatives of two different stocks. *Creightoni* is of the *talpa* group, while *bunki* seems more closely related to *rostrata* and may possibly be considered intermediate between *rostrata* and *pulchella*.

S. bunki is named for the late Bunk Johnson, of New Iberia, Louisiana.

SMITHISTRUMA (SMITHISTRUMA) ROSTRATA (Emery)

Text-figs. 2, 4; Pl. II, fig. 26; Pl. III, figs. 28, 32

Strumigenys rostrata Emery, 1895, Zool. Jahrb. Syst. 8:326, 329, Pl. 8, figs. 23, 23a, 24, worker, female, male. *Strumigenys (Cephaloxys) rostrata* Emery, Gen. Ins. Fasc. 174:325, Pl. 7, fig. 6, worker. M. R. Smith, 1931, Ann. Ent. Soc. Amer. 24:704-705, Pl. 2, fig. 8, worker. L. and R. Wesson, 1939, Psyche 46:99-100, biology. *Strumigenys (Trichoscapa) rostrata* M. R. Smith, 1943, Amer. Midl. Nat. 30:307; 1947, Amer. Midl. Nat. 37:587, Pl. 14, fig. 54, worker.

Worker. TL 2.40-2.75 (2.50-2.65), HL 0.61-0.72, WL 0.61-0.69, CI 67 (rarely 66 or 68), MI 19-20. The total length given by Emery ("2-2½ mm.") and followed uncritically by Smith cannot be accepted. I have examined more than 70 series and additional strays of this species, including nest groups which seemed to be incipient, and the smallest worker found measured 2.42 mm.; out of over 400 workers placed under the ocular grid, only 3 individuals were less than 2.50 mm. long. A point is made of this correction because the total length is an important character for the identification of *rostrata*.

Rostrata has been very well described in the past literature and figured better than any other dacetine ant. Two of Smith's figures are used again here; the side view of the worker (text-fig. 2) is very good in all details, except that it fails to show the transverse row of 4 obliquely erect hairs usually present on the posterior occiput and the two pairs of stiff, erect tapered hairs, one pair (L 0.10-0.12) on the humeri and the other on the sides of the anterior mesonotum (L 0.14-0.16). The full face view (text-fig. 4), taken from the 1931 review, has overinflated antennae and shows a few very minor errors of detail in the mandibular dentition and posterior cephalic pilosity. Except for these details, the figures show very nicely what the species is like.

In all the specimens I have seen, the anterior clypeal border is feebly emarginate in the center. Dr. Smith denies (in litt.) that all specimens show such emargination, but I am of the opinion that all specimens viewed from a perpendicularly dorsal position will show at least feeble traces of the character in question.

The mandibles are quite distinctive in shape and dentition (see Pl. II, fig. 26), the blades depressed and fairly broad, the apices only feebly deflected downward. The rather coarse teeth present an unbroken series from anterior clypeal border to near the apices when the mandibles are closed, imparting to this insect a rather ferocious appearance.

The pilosity of the gaster is not usually flagelliform, since the individual hairs are often truncate or even feebly subclavate at their apices. A transverse row of four such

slender hairs is found anteriorly inclined along the longitudinally costulate anterior portion of the first gastric tergite.

Color dark ferrugineous, gaster darker; occasional specimens very dark, almost black; general specimens much lighter. Dorsum of head often lightly infuscated.

Female: 6 dealate specimens from Alabama, Illinois, Pennsylvania, Ohio, Tennessee and Virginia; TL 2.82-3.01, HL 0.68-0.73, WL 0.72-0.77, CI 67-69, MI 19-21. Eyes large and protruding. Tuberculation of free clypeal border and of dorsolateral occipital borders more conspicuous than in the worker. Scutum finely and rather indistinctly striate over its dense punctulation. Surface of scutellum convex, raised above the level of the scutal dorsum. Mesopleurae (katepisternum and lower half of anepisternum) and alitruncal pleurae posterior to this smooth and shining. Petiolar peduncle at least as long as its node. Basal gastric costulae coarse, subfiliform, extending about 2/5 the length of the first gastric tergite. Color as in workers or a bit darker.

Male: Described by Emery, who gave the total length as "2½ mm." Two specimens from Ohio and Tennessee measure about 2.65 and 2.70 mm. respectively. Still other specimens from both of these states were dissected and were found (in 4 examples) to have genital volsellae as in fig. 28 and mandibles as in fig. 32. It may be noted that Emery's figure of the male mandible shows fewer teeth than in my figure; while this may show normal variation in the dentition, I am inclined to believe that Emery's mandible was drawn at an angle which did not reveal the full dentition. Mandibles which turned in my balsam mounts gave the illusion that certain teeth had disappeared. No other male *Smithistruma* known to me has anything like as full dentition as portrayed even in Emery's figure. Anterior mesonotum with a short, weak longitudinal furrow; notauli quite distinct except posteromedially at the point where they would normally coalesce. Mesonotum evenly and densely punctulate, without striation. Sculpture of sides of alitrunk much as in the female. Vestiges of propodeal teeth forming low obtuse angles; infradental lamellae obsolete except for a tiny angular ventral vestige on each side of the base of the declivity. Petiolar node long, evenly rounded in profile, longer than its peduncle, but broader than long seen from above. Both nodes smooth and highly shining; spongiform appendages vestigial, thinly lamelliform, but a bit better developed than are those of *pulchella*. Gaster without basal costulae, entirely smooth and shining. Color deep brownish-black; nodes and gaster deep castaneous; mandibles, antennae, legs and genitalia sordid yellowish-brown. Volsellae larger than those of the *pulchella*, *clypeata*, and *talpa* groups, shaped much as in *S. (W.) pergandei*. Forewing length 2.2-2.3 mm.; venation as in *pulchella*.

The types of all three castes are in the Emery Collection and presumably also in some other European collections. Various North American collections contain specimens collected by Pergande and labelled as types. These specimens are not true types, but may be nidotypes. *Type locality*: Washington, D. C. (T. Pergande).

More specimens of *rostrata* have been examined during the course of the present work than of any other single species of *Smithistruma*. Many localities have been published by other authors, and there seems to be no point to listing the 60-odd collections from which I have seen specimens. There are numerous collections from the southern parts of New Jersey, Pennsylvania, Ohio, Indiana and Illinois south to the Gulf of Mexico, including low and medium altitudes in the southern Appalachians. West of the Mississippi, *rostrata* has been taken in northern Missouri and in Louisiana, so that it undoubtedly occurs in Arkansas. The record from California given in Smith's paper of 1931 is based on two females determined as *rostrata* by Wheeler; these two specimens are made the types of *S. californica*.

The biology has been summed up pretty well by the Wessons in their paper on the species from southern Ohio (loc. cit.); their statements seem to apply to this common species wherever it is found. I have mentioned elsewhere (in press) some observations on the prey selectivity shown by a *rostrata* colony I have kept in captivity for a year and a half. These ants preferred the collembolan families Entomobryidae and Isotomidae as prey, and shunned genera like *Onychiurus* and *Anurida* offered them. Some of the colonies sent me contained over 200 workers and 3 to 5 queens.

SMITHISTRUMA (SMITHISTRUMA) CALIFORNICA Brown

Smithistruma (Smithistruma) californica Brown, 1950, Trans. Amer. Ent. Soc. 76:40. 41, female.

Holotype female: TL 2.41, HL 0.64, CI 67, MI 17. Head intermediate in shape between *rostrata* and *bunki*. Posterior excision shallow, verticocipit moderately convex in profile to just behind clypeus. Preocular laminae subparallel, weakly convex. Clypeus about 1.10 times as broad as long; sides rounded and rather sharply converging; anterior border transverse, feebly emarginate in the center. Mandibles as in *rostrata*, with similar dentition, but slightly shorter. Distance across the bases of the fully closed mandibles, from external border to external border, about 0.14 mm. Length of antennal scape about 0.36 mm., bent at an angle of 35° or 40° at about the basal third, and broadest at the bend, which is concave posteriorly and subangulate anteriorly. Apical funicular segment longer than the preceding four segments taken together; segment IV about as long as I and longer than II and III taken together.

Alitrunk generally as in the female of *rostrata*, but less robust. Humeral angles blunt, but more distinct than in *rostrata* or *incerta*. Infradental lamellae of propodeum convexly expanded below the short, compressed teeth. Petiole, postpetiole and gaster like those of *rostrata*, allowing for smaller size, with similar spongiform appendages.

Sculpture much as in the female of *rostrata*, although the dorsum of the petiole in both the holotype and paratype seems rather smooth and shining.

Pilosity most similar to that of *rostrata* and relatives, but differing in detail. Clypeal border on each side of the midline with about 11 short, anteromedially curved spatulate hairs, shorter and broader than those of *rostrata*, but not so broad as those of *bunki*. The largest hairs, on the anterolateral "angles," are approximately as long as the third funicular segment, while those higher up on the sides of the clypeus are only about half as long and are much narrower. Hairs on surface of clypeal disc short, subappressed, varying in degree of squamosity and rather small, so that the opaque clypeal surface is clearly visible. Hairs on upper dorsum of head rather small and inconspicuous in dorsal view, fairly numerous, apices spoon-shaped and bent toward the midline, becoming longer and narrower posteriorly. The extreme occipital region with one or two transverse rows of a few longer, erect, weakly clavate hairs. Hairs on anterior border of scape: moderately elongate, those nearest the bend longest and with distinctly broadened apices. Alitrunk dorsum with a very few short simple hairs among more numerous short, subdeclinate and suberect, curved linear-spatulate hairs. Nodes clothed similarly to the alitrunk, but with a few fine flagelliform hairs. Humeri also each with a long weak flagelliform hair. Gaster with a sparse growth of very fine flagellate hairs, erect and distinctly more numerous than those of the worker or female *rostrata*.

Color ferrugineous yellow; tip of gaster slightly darkened.

Holotype female [MCZ] taken by C. F. Baker at Claremont, California; without further data. This and the accompanying paratype bear remains of wings and must have been taken during nuptial flight. I regret to say that I have broken a number of the mandibular teeth in the holotype while seeking to investigate the details of the dentition. The bases of the broken teeth, however, will show the positions and the lack of a diastema very nicely.

Paratype female [MCZ], with same data as for holotype. Head missing. WL 0.82. A single hind wing is still attached.

This is a very puzzling species, and represents the only certain record for *Smithistruma* from west of the Great Plains in North America. Since the type locality is largely given to intensive agriculture and was formerly semidesert in type, it is difficult to believe that any *Smithistruma* is native there. Baker, the original collector, travelled in the Orient, and it is not unthinkable that this collection may be grossly mislabelled. Another possibility is that the species has become established as an immigrant from East Asia. Certainly, the species bears the strongest resemblance to the two *rostrata* group forms I have described from Japan. The clypeal pilosity is quite distinct from that of the closest Nearctic form, *rostrata*, and the size is much smaller. These two females are different from the known specimens of *incerta* and *rostrataeformis* of Japan in a number of pilosity characters and in details of proportions of head, mandibles and clypeus best followed by comparing the descriptions. Because of the possible Oriental origin of the *californica* specimens, I have taken care to satisfy myself of their distinctness from the known species of that fauna. The possibility that *californica* really is a native ant should be investigated, especially since Cole has claimed to have found a specimen (subsequently lost) answering to the *Smithistruma* pattern in northern California. The discovery of the worker caste will probably aid in determining more closely the relationships of *californica*.

NEARCTIC SPECIES NOT ATTACHED TO ANY PARTICULAR GROUP

SMITHISTRUMA (SMITHISTRUMA) OHIOENSIS (Kennedy and Schramm)

Pl. I, fig. 4; Pl. II, fig. 19; Pl. III, fig. 30

Strumigenys ohioensis Kennedy and Schramm, 1933, Ann. Ent. Soc. Amer. 26: 98-99, figs. 1, 2, worker. *Strumigenys* (*Cephaloxys*) *manni* L. and R. Wesson, 1939, Psyche 46:97-99, Pl. 3, fig. 3, worker, biology. (new syn.) *Strumigenys* (*Cephaloxys*) *ohioensis* L. and R. Wesson, 1939, Psyche 46:109, worker, in key. *Strumigenys* (*Trichoscapa*) *ohioensis* M. R. Smith, 1947, Amer. Midl. Nat. 37:587; *S. (T.) manni* also listed here.

Worker: TL 2.24-2.52, HL 0.59-0.65, WL 0.58-0.62, CI 68-72 (69-70), MI 21-26 (23). Measurements from 34 workers from all localities listed below, including the *ohioensis* holotype and types of *manni* and observed size extremes from among 275 workers examined.

Head very superficially similar to the *clypeata* form at first glance, but the occipital lobes more broadly expanded laterally and the preocular laminae only weakly convergent or subparallel. Clypeus varying from extremely slightly broader than long to as long as broad or (very rarely) slightly longer than broad; lateral margins converging anteriorly and forming a more or less continuous outline with the preocular laminae and the external borders of the closed mandibles. Anterior clypeal border with a very thin, narrow, rounded lamelliform border, this border weakly depressed and difficult to see in specimens with full pilosity unless a drop of liquid be added for the purpose of rendering the hairs transparent. When dry, the clypeus appears somewhat truncate anteriorly, as shown in the figure given by the Wessons. Clypeal surface punctulate-granulose and definitely opaque, with a minute tubercle bearing each clypeal hair. The clypeal hairs abundant and evenly distributed over the discal surface, but very fine, those in the center erect and very short, those on the free border longer, $\frac{1}{8}$ to $\frac{1}{4}$ as long as the greatest width of the clypeus, those on the sides curved away from the midline and with the apical parts curved posteriorly in a very characteristic J-shaped (or S-shaped) hook. The clypeal hairs are truncate apically, and at magnifications of 140 \times do not appear to be any broader at their apices than at their midlengths.

Mandibles large and strong, only moderately convex dorsally; basal lamella triangular, with a broad base and an acute apex, but less acute than in any other Nearctic species and considerably less acute than as shown in Kennedy and Schramm's figure. The lamella rests just at the anterior clypeal border when the mandibles are fully closed. Mandibular diastema very short and indistinct, even as seen in the dissected mandible, followed by a series of strong, sharp teeth; five principal teeth, the third longest.

Pilosity of upper dorsum of head, scapes and dorsum of alitrunk fairly abundant, very fine and moderately long, extremely feebly or not at all enlarged apically and arched toward the midline, more or less erect on the alitrunk, on the scapes directed toward the scape apex. A long flagellate hair is usually present on each humeral angle.

Alitrunk rather evenly convex in profile; some specimens with a feebly impressed metanotal groove. Propodeal teeth rather short but acute, directed slightly dorsad, with the very narrow, concavely arcuate infradental lamellae not widened below. Petiole with a long peduncle; node small and with a short anterior face rising at a rather steep angle. Petiole, postpetiole and gaster with scattered long simple hairs, arched posteriorly on the nodes; crookedly flagelliform, more or less erect hairs on the anterior gastric dorsum; hairs on posterior gaster long, fine, straighter and more erect, some truncate or with feeble apical enlargement.

Color medium to dark ferruginous, the gaster usually darker and sometimes nearly black. Vertex usually infuscated.

Gynotype female, dealate: TL 2.76, HL 0.64, WL 0.68, CI 70, MI 23. Differing from the worker in the usual ways. Petiolar node rather slight, its summit twice as broad as long and shallowly concave viewed from the rear. Median longitudinal carinula of the mesonotum fine but distinct, flanked by some indistinct longitudinal rugulae. Mesonotum covered with abundant, fine posteriorly curved hairs. Basal gastric costulae distinct, with fine crowded intercalary costulae or striae between, extending about $\frac{1}{3}$ the length of gastric tergite I. Ferruginous; mesonotum and ocellar area infuscated. *Gynotype* [MCZ] taken singly in Berlese funnel material from leaf mould, edge of Lake Johnson at Raleigh, North Carolina, Jan. 9, 1949 (D. L. Wray). Three other females from

Illinois and Louisiana are slightly smaller: TL 2.68-2.71, HL 0.63, CI 72-74, MI 21-22.

Allotype male: TL 2.30, HL 0.48, WL 0.72, CI 80. Greatest diameter of eye 0.17-0.18 mm.; full length of mandible 0.18 mm. Mandibles with acute apices meeting at full closure; apical borders concave, each separated from its basal border by a prominent, broadly subdentiform angle. Mesonotum with notauli and anteromedian furrow very nearly obsolete; parapsidal furrows only moderately distinct. Scutal punctulae arranged more or less in longitudinal rows posteriorly, but not forming striation. Propodeal lamellae reduced to very fine carinae, no teeth or angles above, so that the propodeal profile is evenly rounded seen from the side. Ground pilosity of head and alitrunk long, fine, reclinate as in *clypeata*, without extra-long flagellate hairs on the lateral occipital borders; long flagelliform hairs confined to one on each humerus. Otherwise as in the same sex of *pulchella* and *talpa*, but the color generally darker, although the head is definitely black. Forewing as in *talpa*, about 2.2 mm. long; venation as in *talpa*, but the stigma and 2r very lightly pigmented and somewhat indistinct. The allotype and two closely similar males were taken from a nest under a very small stick lying on the ground, Sept. 9, 1947, on the University of Tennessee Farms, Knoxville, Tennessee (D. W. Pfitzer). The allotype will be placed in the MCZ and the alloparatypes in the University of Tennessee Collection.

Material examined: Holotype [MCZ] taken in a partially decayed oak rail embedded in the soil of a densely wooded area bordering a ravine at Tupper's Plains, Meigs Co., Ohio (M. M. Schramm). A single paratype taken with the holotype was not seen; this is deposited in the collection of Dr. C. H. Kennedy at Ohio State University, Columbus, Ohio.

ALABAMA: Bryce Lake, Tuscaloosa Co., leaf litter in deep shade (B. D. Valentine).

ARKANSAS: Washington Co. (M. W. Sanderson).

ILLINOIS: Antioch, Lake Co., from sphagnum moss in tamarack bog; La Rue; Astoria (H. H. Ross and M. W. Sanderson); Lincoln (T. H. Frison); Effingham, forest debris (Smith and Stannard); Giant City State Park (Sanderson and Stannard). All collections by personnel of the Illinois State Natural History Survey.

LOUISIANA: Harahan (F. G. Werner).

NORTH CAROLINA: Fayetteville; Yanceyville; Raleigh; all collections from leaf mould Berlese funnel samples (D. L. Wray).

OHIO: Pike Co. near Sinking Spring, humus in cedar grove (L. and R. Wesson). Types of *manni*; deposited in MCZ, USNM, etc.

TENNESSEE: More than one collection from the University of Tennessee Farms at Knoxville from nests under or in small pieces of wood lying on the soil surface (D. W. Pfitzer, J. W. Jones, Jr.).

VIRGINIA: Falls Church (Nathan Banks).

In all probability, this species will be found to reach southern New Jersey and Pennsylvania in the northeastern part of its range. All the records show that it is definitely a dweller in the soil cover and upper soil layers, often utilizing such shelters as are afforded by small chips and twigs lying on, or wood partly buried in, the soil. There are no records known from logs or stumps projecting well above the soil surface, which probably accounts for the fact that this very common species remained undescribed until 1933. The sphagnum bog record from extreme northeastern Illinois is very puzzling and unusual, especially since this species seems to prefer a rather mild climate judging from the rest of the distributional data.

The Wessons described *manni* without seeing an *ohioensis* type, but after referring to the Kennedy and Schramm description and figures. Unfortunately, this original *ohioensis* diagnosis is misleading in its characterization of the most important features, partly due to the fact that at least the holotype specimen does not have quite the full clypeal pilosity, and partly because the lengths and shapes of the remaining hairs were misjudged both in the original description and in the figures. Furthermore, as is noted above, the shape of the basal lamella was misinterpreted. As crude as it is, the figure given by the Wessons for *manni* seems to me to capture the general habitus of the average *ohioensis* worker head seen full face much better than does Kennedy's drawing from the same position.

Dr. L. G. Wesson has seen the *ohioensis* holotype in comparison with types of *manni*, and he agrees that the synonymy is in order. The holotype happens to be a somewhat nanitic worker, but it matches perfectly the smaller workers of other series.

I do not believe that *ohioensis* is at all closely related to any species of the *clypeata*

group, since very many characters in the female sexes and in the male differ strongly. The true relationships of this species remain obscure, although it is certainly of the same stock as the rest of the Nearctic species. The peculiar J-shaped pilosity of the lateral clypeal borders and the large, weakly diastemate mandibles will serve as distinguishing characteristics for the worker.

SMITHISTRUMA (SMITHISTRUMA) ABDITA (L. and R. Wesson)

Plate I, fig. 3

Strumigenys (*Cephaloxys*) *abdita* L. and R. Wesson, 1939, Psyche 46:106-107, Pl. 3, fig. 6, worker. *Strumigenys* (*Trichoscapa*) *abdita* M. R. Smith, 1947, Amer. Midl. Nat. 37:587.

Worker: TL 2.04-2.36, HL 0.51-0.59, WL 0.51-0.59, CI 69-74, MI 18-22. Measurements taken from 42 specimens, including the types, and representing at least five separate colonies from Ohio, Indiana and Pennsylvania.

The description and figure given by the Wessons fits this ant rather well, although I believe that they have underestimated the average total length and overestimated slightly, especially in their figure, the exposed length of the mandibles. The specimens I have examined, including the types, do not have convergent preocular laminae strictly speaking, but rather the laminae are convex and have a feeble notch just behind the point where they join the lateral clypeal borders. Clypeus 1 1/4 to 1 1/3 times as broad as long, broadly subtruncate anteriorly, the anterior border feebly convex and meeting the convergent sides through even curves. Occipital lobes broadly rounded and definitely expanded laterally.

Mandibles large and sturdy, very distinctly diastemate, weakly arched and the apices downcurved. The acute basal lamella is usually visible at or just anterior to the clypeal border when the mandibles are fully closed; following this, the diastema is longer than the length of the lamella. Principal apical series of 4 stout triangular teeth, no. 2 slightly the longest (nearly or quite as long as the basal lamella) and no. 3 the shortest of this series. The two intermediate teeth beyond the principal series much smaller. In general, the mandibles are distinctly larger, more strongly toothed and with a larger diastema than in the *talpa* group, but series vary somewhat in mandibular development.

Antennal scape in average-sized specimen 0.28 mm. long, only weakly bent near base, gently incrassate. Pronotum laterally submarginate; humeral angles usually bluntly angulate, rarely very weak. Promesonotum and propodeum in profile forming two convexities, of which the propodeal convexity is very feeble, meeting at the feebly depressed metanotal groove. Propodeal teeth more or less elevated; infradental lamellae deeply excised above, but widened subangularly below. Basal gastric costulae short, usually not extending more than 1/4 the length of the basal gastric tergite. Pronotal carinula absent or very feeble.

Sculpture as usual in Nearctic *Smithistruma*; sides of alitrunk largely smooth and shining. Clypeal pilosity distinctive, but varying slightly from one nest series to another; consisting of broadly spoon-shaped and spatulate hairs, erect, but with the broadened portions bent sharply anteriorly, those on the center of the slightly convex disc as large or nearly as large as those along the margins, the latter numbering 7-10 on each side of the midline. The hairs are whitish-transparent and give a woolly appearance, noted by the Wessons, when observed at low magnifications. Hairs of cephalic dorsum posterior to the impressed frontal area and those of the anterior scape borders suberect or erect, broadly spatulate or spoon-shaped apically, gradually becoming more slender on the occiput. Posterior occipital region with one or two pairs of slender filiform or subfiliform specialized hairs; each occipital lobe with one of these hairs on its lateral border. The pilosity is very fragile and easily rubbed off; without it, the habitus of the insect is very radically altered. Humeral and mesonotal tubercles each with a long flagelliform or filiform hair in perfect specimens. Usually 3 or 4 pairs of short, erect or suberect spatulate hairs and a sparse growth of reclinate filiform and subfiliform hairs on the alitrunkal dorsum when pilosity is complete. Hairs of nodes and gaster fine and rather long, mostly erect, with truncate or sometimes even very feebly subclavate apices.

Color ferruginous yellow.

Gynotype female, dealate: TL 2.72, HL 0.60, WL 0.66, CI 76, MI 22. Differs from the worker in the usual ways. Mesonotum with a few delicate longitudinal rugulae in the middle and a fairly abundant growth of filiform hairs, most of which recline poste-

riad. Gastric costulae fine, extending about $1/3$ the length of the first gastric tergite. Color darker than in workers; medium ferrugineous. Gynetype taken from a nest of workers resembling very closely the *lectotype* (see below); nest in a pile of stones on Gibraltar Island in Lake Erie, Ohio (Mary E. Amstutz).

Male unknown.

Material examined, with special remarks on variation: *Type locality*: Jackson, Ohio (L. and R. Wesson). Taken under boards and pieces of slate in a back yard in the town. There were originally three worker cotypes; although no holotype has been designated in print, the specimen, unfortunately damaged, in the MCZ bears the author's label "holotype" and should be regarded as *lectotype* (by present designation).

The "typical form" of this species, with pilosity and mandibles as described above, is represented by specimens from the type locality and from the large Gibraltar Island series (see under gynetype above), as well as by part of the specimens from Catawba Beach, Ohio (M. E. Amstutz; Mary Talbot) and two specimens from a bluff along Spring Creek, Centre Co., Pennsylvania (W. L. Brown). The last-named locality is at 1200 feet altitude in an Appalachian north-south valley. The remainder of the Catawba Beach specimens, which may represent one or more than one colony, differ in having shorter mandibles (MI 18 or 19) than are usual in the "typical" form, and the pilosity is also different in a few minor respects. The few long specialized hairs of the occipital region, gastric dorsum, humeri, etc., are developed as extremely long, fine, attenuated and straggling flagelliform hairs, and the hairs of the clypeus are slightly smaller and less numerous, with the blades mostly turned edge-on to dorsal view, so that at first glance they appear rather narrow. A small, rather badly depilated series from Turkey Run, Indiana (Mary Talbot) agrees well as far as can be determined with the series just described, and the mandibles are rarely as long as MI 19. Before seeing the two Ohio series sent by Miss Amstutz, I was seriously considering describing the Catawba and Turkey Run variants as a new species.

This species undoubtedly has a wider range than the few records indicate. It appears to be a soil-dweller, and for this reason has probably been overlooked in many of the northeastern areas where it should occur. The records are decidedly northern for a *Smithistruma*, and it seems significant that this ant, in all cases but that of Turkey Run, has been taken in localities where *S. (W.) pergandei* is also known to occur. It should be looked for in New York, northern Illinois and in the Appalachians farther south. Nesting sites and foraging areas for this species as known are typically under stones or other objects lying on the soil surface in either shaded or somewhat open situations. The broad clypeus and the broadly diastemate mandibles indicate a possible relationship to the *pulchella* group, and the same characters also suggest distant affinities with the subgenus *Wessonistruma*.

KEY TO SMITHISTRUMA OF NORTH AMERICA*

(Refer to Plates and text-figures)

1. Mandibles very nearly as long as to longer than the clypeus, with a toothless diastema equalling or exceeding in length the space occupied by the apical series of teeth *Smithistruma (Wessonistruma)* Brown 2
- Mandibles considerably shorter than the clypeus; toothless diastema absent or smaller *Smithistruma* s. str. 3
2. Sides of clypeus meeting anterior border through distinctly rectangular corners (apical mandibular teeth all acute; dorsa of petiole and postpetiole without reclinate spatulate hairs; size small, HL under 0.60. Mississippi Valley and Gulf States) *angulata* (M. R. Smith)
- Sides of clypeus passing into anterior border through evenly rounded corners (apical series of teeth alternating acute and low, rounded lobes; dorsa of petiole and postpetiole with reclinate spatulate hairs; size larger, HL more than 0.60. (N.E. States to Iowa, s. to E. Tennessee) *pergandei* (Emery)
3. Dorsum of gaster largely striolate-punctulate and opaque or nearly so, with stout, erect spatulate hairs (spongiform processes of petiole and postpetiole obsolescent, belongs to Neotropical group. Gulf States to West Indies and S. Mexico) *margaritae* (Forel)

* Based on workers, tropical Mexican species omitted.

- Dorsum of gaster smooth and shining when clean, with a row of short longitudinal costulae at base, gastric pilosity long and weak (spongiform processes of petiole and postpetiole well developed) 4
4. Hairs of entire clypeal surface broad, white, scale-like and densely arranged, all appressed, including those on the free border (Mississippi)
.....*rohweri* (M. R. Smith)
- At least some clypeal hairs outstanding or forming a projecting fringe along some part of the free border 5
5. Clypeus forming a blunt raised point anteriorly (point bearing a concentrated group of 8-10 slender, outwardly radiating hairs*dietrichi* (M. R. Smith)
- Anterior clypeal border rounded (clypeal hairs not concentrated as above, or else with strongly bulbous apices) 6
6. Clypeus with a group of 8-10 hairs with strongly bulbous apices radiating from a small anteromedian area (clypeus also with two very long, curved, narrow erect hairs arising one on each side near the midlength; surface otherwise practically naked. E. U. S.)*ornata* (Mayr)
- Clypeal pilosity not as described 7
7. Clypeus weakly concave, shining, its free border sharply bimarginate; clypeal pilosity rather sparse, extremely so in the center (mandibular diastema well developed and distinct at full closure. E. U. S.) 8
- Free clypeal border single, or, if indistinctly bimarginate, then the clypeal surface mostly weakly convex, with pilosity more dense and uniformly distributed and the mandibular diastema very weak and indistinct at full closure 9
8. Hairs on clypeus and upper dorsum of head very fine, not or extremely indistinctly apically broadened; 2 or more hairs near the midlength of clypeus erect, very long and fine, somewhat crookedly flagelliform. (S.E. U. S.)*flirrhina* Brown
- Principal clypeal hairs each with a small but distinct broadening, often appearing feebly fishtail-like at high magnifications, at the extreme apex; hairs on upper cephalic dorsum also with enlarged tips, uniform in length and curved anteriorly. (E. U. S.)*bimarginata* (L. & R. Wesson)
9. Hairs on sides of clypeus fine, mostly distinctly J-shaped, curved posterolaterally (mandibles large, MI 21-26, diastema very feebly developed and indistinct; clypeus opaque, minutely tuberculate. E. U. S.)*ohioensis* Kennedy & Schramm)
- Hairs on sides of clypeus either distinctly apically enlarged or not J-shaped (mandibles smaller or with a well developed, distinct diastema) 10
10. Clypeus approximately as wide as long and about half as wide as the width across the occipital lobes; mandibles somewhat convex dorsally, diastema very small and indistinct, especially at full closure (head with mandibles cuneiform, the preocular laminae straight and distinctly converging anteriorly; CI 63-69) 11
- Clypeus distinctly broader than long and more than half as wide as the width across the occipital lobes, or, if width of clypeus is ambiguous, then the mandibles depressed and with a distinct diastema (preocular laminae parallel or very weakly converging, often convex; head not or imperfectly cuneiform in outline) .. 14
11. Clypeal surface covered densely with short, scale-like appressed hairs, free border with a close fringe of anteriorly-directed linear-spatulate hairs. (E. U. S.)
.....*clypeata* (Roger)
- Hair on clypeal surface not appressed or scale-like, erect or suberect, those projecting from the free border narrow 12
12. Clypeal hairs, including those in the center, very fine, with finely tapered apices, curving gently and obliquely away from the midline (clypeus distinctly shining, yellowish, E. U. S.)*laevinasis* (M. R. Smith)
- Clypeal hairs slender, but with apices feebly broadened or at least not finely tapered, those in the center shorter and with definitely enlarged apices 13
13. Clypeus distinctly shining (N. Carolina to Gulf States; see discussion in text)
.....*brevisetosa* (M. R. Smith)
- Clypeus indistinctly shining to nearly completely opaque (Virginia to Illinois; see

- discussion in text) *pilinosus* (Forel)
14. Most or all of the large hairs on the sides of the clypeus curved away from the midline (and broadened at their apices) 15
 Most or all of the large hairs on the sides of the clypeus curved anteriorly or anteromedially (apices broadened or not) 16
15. Head robust (CI over 70); clypeus broad, with an irregular free border, its center depressed and without visible pilosity (E. U. S.) *reflexa* (L. & R. Wesson)
 Head narrower (CI 70 or less); clypeus only slightly broader than long, weakly convex, entirely covered with abundant short, fine posteriorly-inclined hairs (form of head and mandibles as in *talpa*, N. Carolina) *trayi* Brown
16. Hairs fringing free clypeal border finely filiform, not sensibly broadened (form of head and mandibles as in *talpa*, Arkansas) *filialpa* Brown
 Hairs fringing free clypeal border spatulate or spoon-shaped, although sometimes narrowly so 17
17. Pilosity of upper dorsum of head consisting entirely and uniformly of short, curved spoon-shaped hairs 18
 Pilosity of upper dorsum of head not uniformly spoon-shaped; at least a few slender erect or suberect hairs present on occiput (lateral borders of occipital lobes often each with one or two long, weak outstanding hairs) 19
18. Clypeus only very slightly broader than long, its free border lateral to the external margins of the closed mandibles with 6-7 small, crowded spatulate hairs (mandibular diastema longer than length of basal tooth; apical series with only 4 principal teeth. S.E. U. S.) *creightoni* (M. R. Smith)
 Clypeus very distinctly broader than long, its free border lateral to the external margins of the closed mandibles with 4-5 larger, spaced spatulate hairs (mandibular diastema shorter than length of basal tooth; apical series with 5 principal teeth. S.E. U. S.) *bunki* Brown
19. Mandibles coarsely and continuously toothed, without a diastema 20
 Mandibles with a distinct toothless diastema 21
20. Hairs on sides of anterior clypeal border elongate, narrow, curved semicircularly toward the midline (anterior clypeal border usually very feebly emarginate in the middle; infradental lamellae of propodeum narrow and concave; size large, HL usually well over 0.60. E. U. S.) *rostrata* (Emery)
 Hairs on sides of anterior clypeal border rather short and broadly spatulate (anterior clypeal border transverse, barely emarginate; infradental lamellae broadened and convex; size smaller, worker HL probably 0.60 or less. California, possibly a tramp) *californica* Brown
21. Hairs fringing free clypeal border narrowly spatulate, crowded, about 9 on each side of the center, all curved medially and anteriorly (most hairs on upper dorsum of head long, fine, reclinate or subreclinate; clypeus not or only very slightly broader than long. E. U. S.) *talpa* (Weber)
 Hairs fringing free clypeal border larger, broadly spatulate or spoon-shaped, often 7 or less on each side of the center (clypeus distinctly broader than long) 22
22. Clypeal surface with a uniform covering of large, curved spoon-shaped hairs (mandibles long, MI 18-22, apical series with 4 stout principal teeth. Pennsylvania to Indiana) *abditia* (L. & R. Wesson)
 Clypeal surface without hairs in the center, or the hairs in the center much reduced, appressed and inconspicuous (MI 13-18. E. U. S.) 23
23. Head narrow, CI 61-68, mandibles slender (the lateral border of each occipital lobe with a long, fine dorsolaterally curved flagelliform hair. E. U. S.) *pulchella* (Emery)
 Head more robust, CI 67-72, mandibles robust and convex (lateral borders of occipital lobes without true flagelliform hairs. E. U. S.) *missouriensis* (M. R. Smith)

NEOTROPICAL SPECIES OF SMITHISTRUMA

In the following summary, 15 species of the genus, belonging to two subgenera, are recognized for tropical America. The two subgenera are *Smithi-*

struma s. str., with 14 species belonging to three or more species-groups; and *Platystruma* new subgenus, raised for the very aberrant species *depressiceps* (Weber).

The nominate subgenus is represented by a characteristic Neotropical fauna, here divided into the *alberti*, *schulzi* and *ornata* groups. The last-named group is represented by a single species, presently known only from Trinidad. This is *S. hyphata* new species, which is placed with the Nearctic species *ornata* and *dictrichi* more because of similar habitus than for any other reason.

The *alberti* group is rather diverse, although only five species are assigned to it here. It may be divided into two subgroups, *alberti* and *nigrescens* in one and *consersa*, *friderici-mülleri* and *sublucida* in the other.

The *schulzi* group contains eight presently known forms, all rather similar and showing relationship through species like *epinotalis* to the *alberti* group. The *schulzi* group species are mostly arboreal or subarboreal plant-cavity dwellers. Since this group probably contains a much greater number of species than is recognized here, the accurate characterization of the imperfectly known forms *schulzi* and *emiliae* will be needed in order to prevent taxonomic confusion in the group.

In general, the South American fauna in this genus appears to have no close, clearcut relationships with that of any other zoogeographical region. The relationship between the *alberti* group and the Indo-Papuan *capitata* group seems about as close and certain as any, but even this is open to more than one interpretation.

The Neotropical fauna does seem rather sparse when compared to that of eastern North America, but this sparseness probably reflects lack of proper collecting more than anything else. I am convinced that tropical America will yield very many more species when modern collecting techniques, such as use of the Berlese funnel, are employed in rich areas like the Amazon Basin and Colombia. It is probable that the new species remaining to be found will tell us much more about the faunal relationships. Meanwhile, I may guess that the Neotropical fauna is an old one, its stock probably representing an earlier wave or waves of migration from the Old World than that which gave North America its fauna.

Subgenus SMITHISTRUMA sensu stricto

ALBERTI GROUP

Five species, all Neotropical. Basal lamella of mandible broad, either with rounded apex or else broadened into a straightedged translucent lamina. Postpetiole and much of the sides of the alitrunk smooth and shining. Spongiform appendages of petiole and postpetiole usually well developed. The *alberti* subgroup contains two species, one (*alberti*) common throughout much of tropical America, the other (*nigrescens*) in the Caribbean region. The *consersa* subgroup contains three species concentrated in southern Brazil and northern Argentina.

SMITHISTRUMA (SMITHISTRUMA) ALBERTI (Forel)

Pl. II, fig. 17; Pl. III, fig. 27

Strumigenys alberti Forel, 1893, Trans. Ent. Soc. Lond. pp. 380-381, worker, female.
Strumigenys alberti Emery, 1894, Bull. Soc. Ent. Ital. 26:Pl. 1, fig. 5, worker. Wheeler,

1908, Bull. Amer. Mus. Nat. Hist. 24:148, worker, in key. Mann, 1922, Proc. U. S. Nat. Mus. 61(13):39, worker, part., from Honduran localities, not other localities cited. *Strumigenys alberti* var. *intermedia* Wheeler, 1913, Bull. Amer. Mus. Nat. Hist. 32:242, worker. (new syn.) *Strumigenys* (*Cephaloxys*) *alberti* Emery, 1922, Gen. Ins. Fasc. 174:325, var. *intermedia* also listed. *Strumigenys* (*Cephaloxys*) *alberti* subsp. *guianensis* Weber, 1934, Revista de Ent. 4:50, worker. (new syn.)

Worker: TL 2.21-2.66 (2.35-2.55), HL 0.52-0.61 (0.55-0.59), WL 0.60-0.67, CI 76-81 (77-79), MI 30-33. Measurements made in detail on 51 workers from among 185 workers in which HL was measured, representing at least 24 colonies from all the localities listed below and including cotypes of *alberti* and *alberti guianensis* and size extremes among the specimens examined. The type of *intermedia* was compared directly with previously measured specimens and proves to be entirely within the ranges given above.

Head broadly subcuneiform, with a deep, broad semicircular posterior excision; occipital lobes expanded laterally and rather narrowly rounded posteriorly, sides of lobes weakly to moderately convex in front and converging rather sharply. Preocular laminae weakly to distinctly convex and gently converging anteriorly, the lateral cephalic outline from dorsal view discontinuous to subcontinuous. Clypeus diamond-shaped, but with a more or less broadly rounded anterior border; sometimes the anterior border showing an indication of very obtuse, rounded subangulation in the center. Clypeal disc slightly broader than long and about $2/5$ the width across the occipital lobes, feebly convex from side to side, the anterior strip in front of a line connecting the lateral clypeal angles darker in color and feebly depressed, suggesting the more strongly depressed anterior clypeal apron seen in *Serrastruma* species.

Mandibles large and robust, porrect, with only moderate ventral deflection of the apices; approximately as long as the clypeus; somewhat depressed, only feebly convex dorsally. Dentition very characteristic and constant in all series; teeth nos. 1 and 2 of the principal series fused and broadened and forming with the long basal lamella a wide, straight-edged translucent lamina occupying slightly more than half the length of the apical (masticatory) border; the coalescence of the first two apical teeth with the basal lamella is nearly complete, the only remaining separation being a fine linear notch (see fig. 17). Antennal scapes approximately as long as the distance from the apex of the closed mandibles to the posterior clypeal angle, or in absolute terms, 0.41-0.44 mm. long. Bend of scape gentle (ca. 30°), coming at about the basal third; distal of the bend, the shaft gently incrassate, greatest breadth near the midlength. Funiculi about $1\frac{1}{2}$ times as long as the scapes, rather slender; apical funicular segment slightly longer than segments I-IV together; IV approximately equal in length to I and to II + III; II and III both a little longer than broad, II slightly the longer.

Eyes moderately developed, weakly convex, each with about 5 or 6 facets in the greatest diameter; situated on the ill-defined lower scrobal borders a trifle posterior to the cephalic midlength; not usually visibly protruding at the sides when the head is seen from dorsal view.

Alitrunk in profile forming a long, even promesonotal convexity and a short, slight propodeal convexity, the two almost continuous, interrupted by a feeble depression centering on the distinct but shallow metanotal groove. Pronotum with a rounded, sharply marginate anterior border and bluntly indicated humeral angles. Promesonotal suture obliterated on the dorsum, but the median carinula of the promesonotum quite distinct. Mesonotum feebly marginate laterally; propodeal surface very slightly longer than broad, submarginate along the sides. Propodeal teeth compressed, strongly acute, $1/2$ to $3/4$ as long as the distance between the centers of their bases, elevated and slightly divergent posteriorly. Infradental lamellae very narrow, but not so much reduced as in *margaritae*; edges concave to nearly straight.

Petiolar node about as long as its peduncle, seen from the side subglobose, but seen from dorsal view feebly subquadrate and distinctly wider than long; a pair of very fine carinulae extend, one on each side of the anterior nodal face, from the summit down onto the peduncular dorsum. Ventral longitudinal spongiform strip present and distinct, but fairly narrow; posterior collar developed into a moderate triangular lobe on each side behind; the greater part of the sides of the node free. Postpetiole transversely ovate, only about $1\frac{1}{4}$ times as wide as the petiolar node; disc evenly convex and usually smooth, shining, surrounded by well developed spongiform masses. Gaster usually fairly bulky, not noticeably depressed, with a narrow transverse anterior spongiform margin and a heavy

anteroventral pad; basal costulae averaging 11-14 in number, coarse and well separated, extending 1/4 to 1/3 the length of the basal gastric tergite. Remainder of gaster smooth and shining.

Sculpture of the pattern usual in *Smithistruma*; head, alitrunk and petiole evenly and densely punctulate; promesonotum in some specimens with a partial suggestion of feeble longitudinal striation or rugulation. In the smallest specimens, the promesonotal sculpture often partially effaced, appearing feebly subrugulose and in some places weakly shining. Sides of posterior alitrunk, and sometimes a small part of the sides of the pronotum, smooth and shining. Mandibles and appendages feebly and very finely sculptured, for the most part subopaque.

Ground pilosity very scarce on promesonotum, more abundant but still rather sparse on the cephalic dorsum, composed of linear-spatulate subeclinate hairs, those on the clypeal disc finer and shorter than those on the verticocipit, all or nearly all directed anteriorly. Fringing hairs of free clypeal border crowded, larger than those on the disc, but still not very conspicuous, 6-7 on each side of the middle, all narrowly spatulate and curved medially. Anteriorly fringing hairs of scape slender and linear-spatulate or subspatulate, 6-7 in number, all curved distad except the third and fourth from the base, which are curved basad.

Posterior occiput with a transverse row of four stiff, erect, narrowly spatulate hairs, of which the outer two are sometimes subeclinate and scarcely distinguishable from the ground pilosity. Additional central pair of the same present or absent on the vertex; long lateral hair on the side of each occipital lobe flagelliform. Humeral and mesonotal pairs flagelliform. Nodes each with about four, gaster with four or five transverse rows of four each long erect or suberect hairs, all more or less posteriorly curved. These hairs are rather stiff, and may either be truncate apically or with a short, fine apical attenuation, the latter sometimes looped back against the shaft of the hair, causing it to appear spatulate at first glance.

Color varying rather widely from very light ferruginous yellow to deep brownish ferruginous, the variation not territorial, but one nest usually relatively uniform if obvious tonerals are not considered. Usual color is medium to medium-deep ferruginous.

Female: TL 2.95-3.11, HL 0.60-0.65, WL 0.81-0.85, CI 80-83, MI 28-30. Eight females from widely different parts of the range were measured. Among these, there was slight variation in color, size, proportions and length of propodeal teeth.

Differing from the worker in the usual full sexual attributes. Head more broadly and shallowly excised behind. Mandibles about 9/10 the length of the clypeus. Mesonotum with median carinula very weak or absent, except on scutellum, where it is strong and complete, posteriorly helping to form a small but distinctly jutting point. Petiolar node seen from above twice as broad as long, the anterior border straight and transverse. Propodeal teeth much shorter, blunter and farther apart than in the worker. Venation of the forewing in a specimen from Campinas, Brazil: R + Sc, stigma, and 2r sharply defined and weakly pigmented; Rsfl, M + Mfl, CuA and Rsf5 present, but poorly defined and weakly pigmented; Mf4 indicated as a groove; basal stub of Rs + M present. Body color varying from light to vary dark ferruginous, gaster often darker; color in general usually darker than in workers of the same colony.

Male volsella as in fig. 27. Remainder of male body not described because of a lack of suitable specimens.

Remarks: The taxonomic background of *alberti* and its supposed subspecies and varieties is extremely confused. As of 1948, the classification summarized below was unchallenged:

alberti Forel, 1893
var. *nigrescens* Wheeler, 1911
var. *intermedia* Wheeler, 1913

var. *nana* Santschi, 1930
subsp. *guianensis* Weber, 1934
subsp. *longipilis* Weber, 1934

I have managed to see types of all of these forms except *nana*, and in this case, I have specimens from some of the same Cuban series Santschi had on hand and mentioned in the original description. Among this entire aggregation of specimens, I can distinguish two and only two forms. One form is larger, with large mandibles having dentition as in fig. 17; the types of *alberti*, *intermedia*, and *guianensis* represent this species. These three are identical, and therefore take the prior name *alberti*. The other form is smaller,

with relatively shorter and more delicate mandibles having dentition as in fig. 15. This dentition was described in detail by Weber in 1934 (loc. cit.), but under the name *alberti*. Belonging to this second form are the types of *nigrescens* and *longipilis*, and presumably that of *nana*. The prior name, unfortunately, is *nigrescens*, and this will have to be applied. I say unfortunately because the unique type of *nigrescens* is a very dark-colored worker, while the very great majority of the specimens I have seen belonging to this species are light ferrugineous in color. Very dark variants are not at all unusual among Neotropical dacetine species, and I do not think it wise to consider the dark and light forms as taxonomically distinct unless it can be proven that the coloration is apportioned territorially on a fairly large scale. In my opinion, there are indications in the presence of intergradient color forms that territorial apportionment does not hold very well in this case.

The confusion with regard to these two species dates back to Wheeler (1913, loc. cit.), who consistently misidentified Cuban forms (*nigrescens*) as *alberti*. The true *alberti*, when found, was named as an infraspecific variant twice, by Wheeler and Weber. European workers, on the other hand, correctly identified *alberti*, but placed the smaller form as an infraspecific variant to it. Following Wheeler, all American workers have considered the small form from Cuba as the typical *alberti*, whereas the true *alberti* has not yet been taken on Cuba. That the two species are completely distinct as such is shown both by the constantly different mandibular dentition and by the striking difference in body size; furthermore, both species occur together in abundance along the Gulf Coast of Costa Rica without producing the slightest sign of intergradation. *Alberti* occurs from southern Mexico to Bolivia and on certain of the Lesser Antilles, but not in the Greater Antilles; I believe that its occurrence even in the Lesser Antilles must be due to relatively recent introduction. The type locality of *nigrescens* is Jamaica, and it is no doubt common there, since it is unusually abundant and widespread through Cuba and Haiti. On the mainland, *nigrescens* has been taken only on the Gulf Coast side of Costa Rica; Dr. Weber has more recently captured a colony on Trinidad. While it seems probable that *nigrescens* acts as a tramp in the Caribbean area, its original range is open to question.

Material examined (alberti): Two cotypes [type material deposited in Forel Coll.]

Type locality: St. Vincent, B. W. I. (H. H. Smith).

MEXICO: Tetzonapa, Vera Cruz, one stray worker (H. S. Dybas); El Palmar, 16 km. west of Tetzonapa, Vera Cruz, 600 feet altitude, forest around rubber and coffee plantations; two colonies from rotten logs, one containing 130 workers, 3 dealate females (F. G. Werner). St. Lucrecia, Tehuantepec (W. M. Mann).

HONDURAS: Cecilia; San Juan Pueblo (W. M. Mann).

COSTA RICA: Zent; Colombiana Farm, Santa Clara Prov.; Estrella Valley (W. M. Mann). Hamburg Farm, Santa Clara Prov., several colonies (F. Nevermann).

PANAMA CANAL ZONE: Barro Colorado I.; Rio Chinillo, series from several colonies (J. Zetek).

DOMINICA, B. W. I.: Long Ditton near Roseau (Crampton, Lutz and Miner) type of var. *intermedia*, a unique. Another collection, a series containing winged females and workers, was taken by the same collectors at Laudet in 1911. Type of *intermedia* in AMNH.

BRITISH GUIANA: Kartabo (W. M. Wheeler) type series of subsp. *guianensis* [MCZ].

BRAZIL: Campinas, Goyaz (Schwarzmaier).

BOLIVIA: Covendo; Huachi, Rio Beni (W. M. Mann).

Biological data accompanying six of the series indicate that the nests are established by preference in rotten logs either in forest or in partial clearings. The records suggest that this species may have the widest range of any *Smithistruma* species; it will probably prove to be the commonest species of the genus throughout most of the tropical American mainland. The close resemblance between *alberti* and the larger species of the Indo-Papuan *capitata* is very striking, and possibly indicates a real phylogenetic relationship. *Alberti* is not likely to be confused with any species but *nigrescens*, and the differences are thoroughly discussed above, below, and in the key.

SMITHISTRUMA (SMITHISTRUMA) NIGRESCENS (Wheeler)

Pl. II, fig. 15

Strumigenys alberti var. *nigrescens* Wheeler, 1911, Bull. Amer. Mus. Nat. Hist.

30:28, worker. *Strumigenys* (*Cephaloxys*) *alberti* var. *nigrescens* Emery, 1922, Gen. Ins. Fasc. 174:325. *Strumigenys* [and *S.* (*Cephaloxys*)] *alberti* of various American authors, not Forel, 1893. See Wheeler, 1913, Bull. Mus. Comp. Zool. Harvard 54:496. *Strumigenys* (*Cephaloxys*) *alberti* var. *nana* Santschi, 1930, Bull. Soc. R. Ent. Egypte 14:80, worker. (new syn.) *Strumigenys* (*Cephaloxys*) *alberti* subsp. *longipilis* Weber, 1934, Revista de Ent. 4:50, worker. (new syn.)

Worker: TL 1.78-2.08, HL 0.46-0.52, WL 0.42-0.51, CI 71-76, MI 21-24, ICD 51-54. Measurements and proportions from 45 workers from among over 200 workers examined, including size extremes and representing at least 25 separate colonies from Cuba, Haiti, Costa Rica and Trinidad.

This is the common species in the Greater Antilles, and with the possible exception of *S. margaritae*, seems to be the only member of the genus that has been found in these islands. Prior to November, 1949, determined specimens I returned to various correspondents bore the label "*alberti*," while true *alberti* specimens were determined by me as "*guianensis*." Up to that month, I had not been aware that the older American determinations were incorrect. Since specimens of both species, whether or not correctly labelled, occur in most collections of any size, and since *nigrescens* is so similar to *alberti* in most respects, I present here a comparative description.

Head as in *alberti*, but a little narrower and with the sides of the head not so nearly continuous in outline. Clypeus slightly broader than long, the curve of the free border more transverse anteriorly, but still feebly convex here, the resultant anterolateral "corners" evenly rounded. Mandibles depressed, always shorter than the clypeus (averaging about 4/5 as long as the clypeus considering the exposed length at full closure) and with dentition very constant in pattern, as shown in fig. 15.

Antennal scape (average L about 0.24 mm.) bent at about a 35° angle near its basal third, only weakly incrassate, thickest at or a bit distad of its midlength. Average length of funiculus about 0.40 mm.

Alitrunk like that of *alberti*, but relatively more slender, slightly more depressed, with the metanotal groove less distinct and often entirely effaced. Humeri obtusely angulate, with small but distinct piligerous tubercles; paired lateral mesonotal tubercles small but distinct, forming low, rounded lamelliform lobes. Propodeal teeth translucent, acute, a little shorter relatively than in *alberti*, and usually approximately half as long as the distance between the centers of their bases, continuous with the infradental lamellae; the lamellae varying slightly in width from series to series, usually rather narrow and gently concave, but always wider than in *alberti*; in some specimens, there is a weak indication of angulation or convexity at the ventral extremities.

Petolar and postpetiolar nodes relatively much less robust than in *alberti*. Petiolar node more than half again as long as broad and seen in profile, rather narrowly rounded above. Spongiform appendages voluminous, slightly better developed than are those of *alberti*. Gaster rather small, basal segment taking up 2/3 or less the total gastric length. Basal costulae few and well separated, 11-15 in number, extending about 1/5 to 1/4 the length of the basal segment.

Sculpture weaker than in *alberti*. Pronotal punctulation variable, often partially effaced or replaced by feeble, indefinite longitudinal striation, the surface often subopaque or even partially weakly shining. Median carinula usually well developed and extending the length of the pro- and mesonotal dorsa. Punctulation of petiolar node often partially effaced, the surface subopaque or even weakly shining. Postpetiolar disc, gastric surface, sides of alitrunk including most of lateral pronotal surfaces, smooth and shining.

Ground pilosity of head as in *alberti*, but the hairs shorter and less conspicuous, more mesially directed. Long erect hairs of occipital region as in *alberti*, but more slender; no median pair present on the vertex; pair of flagellate hairs on the lateral occipital borders very long, fine and straggling. Alitrunk with extremely few, very inconspicuous subappressed, weakly spatulate ground hairs. The specialized flagellate hairs of the body are usually quite long, very fine and straggling, not or very rarely broken off at midlength and usually not folded back upon themselves "buggy-whip fashion" as those of *alberti* so often are. These long hairs are placed one on each of the paired humeral and mesonotal tubercles, and on the nodes and gaster are arranged as in *alberti*, i.e. in rough rows of four each on the gastric dorsum.

The hairs of the *longipilis* type are not longer than is usual in undamaged specimens

of this species, but they are covered with dust in such a way that they are more conspicuous than usual.

Color of most series light ferrugineous yellow to medium ferrugineous, gaster and sometimes dorsum of head very feebly darkened. The *nigrescens* type specimen is dark ferrugineous, the head and gaster deep mahogany. According to the original description, the type specimen (holotype) of *nana* is intermediate in color.

Gynetype female, alate: TL 2.27, HL 0.51, WL 0.58, CI 80, MI 24, forewing L ca. 1.8 mm. Differs from the worker in the usual ways. Erect feebly spatulate hairs of the head present in the normal "*Strumigenys* pattern," with a pair straddling the ocellar triangle and a transverse row of four on the posterior occiput. Flagelliform hairs as in the worker, similarly placed. Scutum feebly longitudinally rugulose in the center, with a median carinula; scutal hairs subflagellate, curved posteriorly. Color bright ferrugineous; ocellar triangle deeply infuscated.

Gynetype taken at Hamburg Farm, Santa Clara Province, Costa Rica, March 25, 1925 (F. Nevermann); deposited in USNM. Male unknown.

Material examined: Holotype [AMNH]; *type locality*: Mandeville, Jamaica (Wight).

CUBA: Baracoa; Mina Carlota (W. M. Mann). Soledad, Cienfuegos (W. S. Creighton; N. A. Weber). Cayamas, *longipilis* holotype (E. A. Schwarz). Cumanyagua; Mina Carlota (W. S. Creighton), parts of original nest series mentioned in *nana* description. Mina Carlota (G. Salt). Havana (A. Bierig). Cienaga de Zapata (W. M. Wheeler).

HAITI: Mts. n. of Jacmel; Diquini; Petionville (W. M. Mann).

COSTA RICA: Hamburg Farm, Santa Clara Prov., series from 3 different colonies.

TRINIDAD: Without further locality (N. A. Weber, No. 37).

S. nigrescens is a very common ant in Cuba, occurring in all sort of habitats. It is known from one end of the island to the other in agricultural as well as wilder districts. It appears suspiciously like a tramp species in distribution and behavior; though it may originally have come from Central America, there appears to be no way of ascertaining its original distribution. Many of the reported colonies were found nesting under stones. Extensive collecting has not revealed its presence on Puerto Rico.

If the typical dark-colored *nigrescens* is found to represent a distinct geographical color race inhabiting Jamaica, the light-colored populations will have to take the name *nana* Santschi. I have stated above that I regard the taxonomic distinctness of the dark form as improbable.

SMITHISTRUMA (SMITHISTRUMA) FRIDERICI-MÜLLERI (Forel)

Pl. II, fig. 21

Strumigenys friderici-mülleri Forel, 1886, Mitt. Schweiz. Ent. Ges. 7:213, 216, worker. *Strumigenys friderici-mülleri* Mayr, 1887, Verh. Zool.-bot. Ges. Wien, 37:570; Emery, 1890, Bull. Soc. Ent. Ital. 22:Pl. 8, fig. 1, worker. Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24:148, worker. *Strumigenys (Cephaloxys) friderici-mülleri* Emery, Gen. Ins. Fasc. 174:325.

Worker: TL 2.01-2.29, HL 0.52-0.53, WL 0.67-0.72, CI 68-73, MI 20-21. Measurements taken from three of four cotypes examined, these all thought to be from the same nest.

Habitus somewhat like that of small rostrata workers. Occipital lobes distinctly bulging laterally; preocular laminae very nearly or quite parallel. Clypeus in total outline subtruncate anteriorly, the anterolateral angles broadly rounded, the transverse anterior border weakly convex and the sides converging anteriorly. The anterior border lamelliform, depressed below the level of the broadly diamond-shaped disc. Exposed length of the closed mandibles more than half as long as the clypeus; dorsal mandibular surfaces weakly convex, the outer margins subcontinuous with the sides of the clypeus. The basal and apical borders of the mandibles meet through a very obtuse angle, as in other *Smithistruma*, and are not continuous as Forel states. The dentition of the mandible as shown in the figure is incomplete, due to the fact that the only specimen upon which dissection was risked was damaged in the act. From other specimens examined, however, the third tooth seems to be the longest of the apical series.

Eyes moderate in size. Antennal scapes moderately incrassate, broadest at basal third, only feebly bent, anterior border sublamelliform, evenly rounded.

Alitrunk dorsum in profile evenly and moderately convex; metanotal groove marked by a very feeble impression. Anterior pronotal border broadly rounded and sharply marginate, terminating on each side in a distinct, tuberculate humeral angle; lateral pronotal borders weakly submarginate. Lateral mesonotal tubercles low but distinct. Propodeal teeth moderate in size, about half as long as the distance between the centers of their bases, acute; infradental lamellae narrow and concave, but feebly widened and convex ventrally. Petiole with a long, rather slender peduncle and an abrupt but dorsally rounded node, the latter $\frac{3}{4}$ as wide as the postpetiolar disc. Postpetiole rather small, transverse, with nearly straight anterior and posterior borders and sharply rounded sides, convex dorsal surface; width of free portion of disc about equal to the distance across the posterior pronotal angles. Both nodes with abundant spongiform tissue. Gaster anteriorly with a broad dorsal border of spongiform material, from this a number of short, fine, subuliform costulae extend a little way onto the surface of the first gastric segment, which is otherwise smooth and shining.

Sculpture as usual in the genus, except that the punctulation of the anterior part of the pronotum is somewhat effaced, with the result that part of the surface is nearly smooth and moderately shining. Sides of alitrunk and dorsum of postpetiole smooth and shining. Clypeus finely granulose-punctulate and opaque, set rather sparingly with short, subappressed spatulate hairs; free clypeal border with an even fringe consisting of about 8 medially curved spatulate hairs on each side, the four immediately on each side of the center of the anterior portion of the border shorter than those on the sides. Antennal scapes with 6-7 narrowly spatulate hairs on the anterior border. Ground pilosity of rest of dorsum of head consisting of sparsely set, small, slender spatulate hairs. Four long erect subclavate hairs on the occiput and a long, weak flagellate hairs on each lateral occipital border. Humeral and mesonotal tubercles each with a long, prominent flagellate hair; dorsum of alitrunk otherwise with a very few scattered, inconspicuous subappressed subspatulate hairs. Nodes of petiole and postpetiole and gastric dorsum with sparse, very long, weak erect flagellate hairs.

Color medium ferrugineous. Female and male unknown to me.

Redescribed from four cotype workers, three sent by Dr. Ch. Ferrière from the Forel Coll., and one of which has been deposited in the MCZ. The other cotype came from the collection of the Secretariat of Agriculture (Museu Paulista), São Paulo, Brazil. *Type locality*: Itajahy, Brazil (F. Müller).

Smithistruma (*Smithistruma*) *sublucida* new species

Holotype worker: TL 2.46, HL 0.59, WL 0.56, CI 64, MI 16. Differs from the types of *friderici-mülleri* as follows:

- (1) Humeral angles tuberculate, but not so prominent or sharply angulate.
- (2) Sculpture effaced over most of the alitrunk, with only feeble, superficial shading on the posterior pronotum, mesonotum and propodeum. The entire surface of the alitrunk in clean specimens therefore appears smooth and shining. This sculpture is quite different from that of *friderici-mülleri*, which species has the sides of the pronotal dorsum and all of the mesonotal and propodeal dorsa with the usual granulose-punctulate sculpture. In *sublucida*, the dorsum of the petiolar node also has the sculpture somewhat effaced and is weakly shining in most lights.
- (3) Ground hairs of head decidedly larger, more conspicuous and more broadly spoon-shaped than in *friderici-mülleri*; more nearly reclinate or appressed and directed mesad. Two slightly longer erect hairs on the center of the occiput, these with weakly clavate-spatulate apices, and one of the same on each lateral occipital border. Flagellate hairs of nodes and gaster extremely long and fairly abundant, the ones on the gastric dorsum averaging as long as the first gastric segment, very fine, arched back to the integumental surface and appearing like croquet wickets in this respect. Pilosity of alitrunk as in *friderici-mülleri*, but the corresponding flagellate hairs even longer and finer.
- (4) Metanotal groove narrow, but distinct, seen as a notch in profile view of the dorsal outline. Lateral mesonotal tubercles more prominent, subconical.
- (5) Propodeal teeth long, straight, spiniform, almost as long as the distance between the centers of their bases, nearly horizontal; infradental lamellae reduced to low cariniform borders like those of *consersa*, considerably more reduced than in *friderici-mülleri*.

The mandibles were not dissected, but these and the clypeus seem from outside exam-

ination to be much as in *friderici-mülleri*. Seen *in situ*, the mandibles appear to have a rounded basal lamella, partly visible at full closure, and a principal series of five acute teeth and two intermediate acute teeth. The basal costulae of the gaster are well developed and extend about $\frac{1}{4}$ the length of gastric tergite I. Color medium ferrugineous; gastric segment I dorsally darkened to a light reddish-brown shade.

Holotype [Borgmeier Coll.] taken at Porto Alegre, Rio Grande do Sul (P. Buck) together with the paratypes described below.

Two paratypes (with same data as for holotype) [Borgmeier Coll., MCZ] TL 2.09, 2.33; HL 0.57, 0.59; WL 0.54, 0.56; CI 66, 65; MI 17, 16. Two more paratypes besides the above were seen belatedly from the collection of Sr. Mario Consani; these bear the same data as the holotype and do not differ significantly from the specimens described above [Consani Coll.].

S. sublucida may be distinguished from the two closely related forms, *S. friderici-mülleri* and *S. conspersa*, by the largely smooth and shining surface of the alitrunk.

SMITHISTRUMA (SMITHISTRUMA) CONSPERSA (Emery)

Strumigenys conspersa Emery, 1905, Bull. Soc. Ent. Ital. 37:169, fig. 29, worker. *Strumigenys (Cephaloxys) conspersa* Emery, 1922, Gen. Ins. Fasc. 174:325.

Worker: TL 2.01-2.07, HL 0.52-0.53, WL 0.48-0.50, CI 66-69, MI 19-22.

Emery's original figure shows the head of this species and captures habitus and pilosity features fairly accurately. The specimens from Alta Gracia collected by Bruch seem without a doubt to belong to this species; they differ from Emery's figure only in that the basal lamella of the mandible is a trifle more broadly rounded at the apex (but not so broadly rounded as that of *friderici-mülleri*). *S. conspersa* is closely related to *S. sublucida*, and has somewhat similar pilosity and the same long, spiniform propodeal teeth and cariniform infradental lamellae. The pronotum is entirely punctulate. Color medium ferrugineous. The specimens I have seen are probably all from the same nest, although they came to me through various sources. For this reason, I cannot say anything significant about the variation.

The species is similar in many ways to *S. rostrata*, and its presence as far south as Cordoba indicates that it is a temperate climate form. I rather incline to the belief that the resemblances to *rostrata* may be due to convergence.

Type locality: Argentina (F. Silvestri). Types in Emery Coll.

Material examined: Four workers, Alta Gracia, Cordoba (C. Bruch).

SCHULZI GROUP

A compact group of small species restricted to the New World in tropical and subtropical regions. A number of characters link them, though not all of the species agree perfectly in showing all of these features. The best universal character lies with the sculpture of the sides of the alitrunk, which is evenly and completely punctulate and opaque, or nearly so, in all the species thus far known. Other characters, most of which will not hold in one or more species, are the following:

(1) Habitus of the "normal" *Smithistruma* sort, body slightly to moderately depressed and rather compact.

(2) Mandibles with the usual dentition; basal lamella broadly triangular, with either rounded or angular apex; no toothless diastema present. Blades rather strongly depressed.

(3) Antennal scapes depressed and incrassate, the anterior border sharp and broadly rounded. Funicular segment III very short, usually transverse.

(4) Postpetiolar disc most often punctulate and opaque or subopaque.

(5) Spongiform appendages in most species drastically reduced, absent or vestigial on the petiole except in *epinotalis*.

(6) Pilosity short, spatulate or spoon-shaped; gastric dorsum with con-

spicuous, obliquely erect hairs, moderate in length and with thickened or flattened apices. Specialized erect hairs of head and alitrunk absent or relatively poorly differentiated and not well developed in most species.

In most of the species, the eyes are rather large and coarsely faceted compared with other *Smithistruma*. This ocular development is apparently correlated with the mode of life, for the majority of the species appear to choose arboreal or subarboreal nest sites. Where the nest sites have been recorded, in all species of the group except the aberrant *margaritae*, the colonies were found in plant cavities such as orchid pseudobulbs, spaces within other epiphytes like *Tillandsia*, under bark of standing trees, in the spatha of an aroid vine, etc., etc. Two of the species are known only from specimens intercepted in plant quarantine on epiphytic orchids originating in northern South America. The finding of several new species of *Strumigenys* in the same circumstances shows that there must be a very large arboreal fauna of dacetines as yet virtually unknown in the Neotropical Region. *Strumigenys rebi* Forel and *S. tococae* Wheeler are probably Amazonian representatives of this fauna. Indications that the same situation applies in the Indo-Papuan and Ethiopian Regions are furnished by series in my working collections as yet unreported upon. In order that an arboreal fauna of *Strumigenys* complex species may maintain itself, a rich fauna of collembolans is probably necessary in the same habitat. If this is so, then it would seem that mossy, epiphyte-laden cloud- or rain-forest is the best place to look for arboreal dacetines. In cloud-forests, the limit between the vegetation of the ground and that clinging to the trees is often so indefinite as to be merely academic, so that many "arboreal" species in such an environment may live either on the ground or in the trees proper.

The species of the *schulzi* group as outlined below are often differentiated on relatively minor characteristics of size, proportion, color, sculpture, pilosity, etc., but in the few species which are known from several collections these characters seem to hold constant. Much more collecting will be needed to determine whether this degree of constant variation holds throughout the group. Furthermore, it is necessary, in view of the closeness of the species and the ambiguity of the original descriptions, that *emiliae* and *schulzi* be redescribed more thoroughly and with measurements that can be confidently compared to those given below.

SMITHISTRUMA (SMITHISTRUMA) EPINOTALIS (Weber)

Pl. II, fig. 23

Strumigenys (*Cephaloxys*) *studiosi* subsp. *epinotalis* Weber, 1934: April, Revista de Ent. 4:46, worker, female. *Strumigenys* (*Cephaloxys*) *skwarrae* Wheeler, 1934: November, Bull. Mus. Comp. Zool. Harvard 87:177-178, worker. Skwarra, 1934, Ökologische Studien über Ameisen und Ameisenpflanzen in Mexico. R. Leupold, Königsberg (private printing), ecology. (new syn.)

Worker: TL 1.88-2.11, HL 0.48-0.53, WL 0.49-0.60, CI 77-80, MI 22-24. Measurements from 30 workers, including a nidotype of *epinotalis* and cotypes of *skwarrae*, and representing at least 7 separate colonies from Mexico and Costa Rica, including size extremes selected during a rough examination of about 150 specimens.

With general characters of the *schulzi* group, except as noted. Posterior occipital excision semicircular, moderate in width. Preocular laminae approximately straight, distinctly converging anteriorly. Clypeus weakly subpentagonal, the anterolateral corners rounded and indistinct. Anterior clypeal border convex, with a narrow, indistinctly depressed apron. In a specimen with HL 0.53, the exposed length of the scape is 0.26 mm., of

funiculus, 0.40 mm. The scape is incrassate, but not so strongly as in *studiosi*; anterior border evenly rounded. Funicular segments: IV slightly longer than I; II + III shorter than I; II not longer than broad, but longer than III; III broader than long; V very slightly longer than IIV taken together. Mandibles depressed, only weakly deflected apically; dentition as in fig. 23.

Anterior pronotal border sharp, semicircularly curved; humeral angles not developed. Pronotal dorsum with a curved, blunt transverse ridge, behind which is a faint promesonotal sulcus. Metanotal groove indistinct. Seen from the side, the dorsal alitruncal profile is evenly and gently convex without distinct interruption. Propodeal teeth acute, slightly elevated, almost entirely involved in the broad, convex infradental lamellae. Petiolar node broader than long, with a sloping anterior face; summit narrowly rounded seen from the side. Petiolar spongiform tissues more strongly developed than in any other known *schulzi* group member, but not so strongly as in the Nearctic groups. Posterior transverse collar rather well developed, forming blunt posterolateral lobes. Midventral strip quite distinct and of moderate width. Postpetiolar disc convex, very nearly or quite completely smooth and definitely shining. Postpetiolar appendages well developed, but not covering anterolateral surfaces of the node. Gaster with anterodorsal transverse spongiform margin and anteroventral pad. Basal gastric costulae distinct, with fine indistinct intercalary striation, extending $1/4$ to $1/3$ the length of the first gastric tergite.

Sides of alitrunk completely and densely punctulate and opaque in most specimens; a few individuals with a restricted area at the anteroventral corner of the mesepisternum having punctulation more or less effaced and smooth.

Cephalic ground pilosity composed of numerous small, crowded spoon-shaped hairs bent strongly mesad. Erect hairs of occipital region only weakly differentiated from the ground pilosity and not very long. Hairs on anterior scape border spoon-shaped, usually 8 in number, largest and broadest nearest base. Clypeus with very small subappressed spatulate hairs on discal surface; free border with 7-8 short, crowded, mesially curved spatulate hairs. Dorsum of alitrunk with relatively few small but conspicuous curved or curled, broadly spoon-shaped hairs, mostly concentrated along the semicircular ridge in front of the promesonotal sulcus; a few of these hairs also on the mesonotum; all or nearly all of the alitruncal hairs bent toward the midline. No long differentiated paired humeral or other erect hairs. Nodes and gaster with the usual obliquely erect spatulate hairs of the *schulzi* group.

Color yellowish- to medium ferrugineous, gaster usually darker than thorax. In darker specimens, the head may also be very faintly darkened above.

Female: TL 2.15, HL 0.56, WL 0.64, CI 79, MI 23. Mesonotum densely punctulate, without median carinula or rugulation, but with 6 pairs of erect hairs with weakly enlarged apices in addition to the ground pilosity. Dorsum of gaster posteriorly with scattered, small, inconspicuous appressed simple hairs in addition to the spatulate erect ones. Punctulation of anterior mesanepisternum and center of mesokatepisternum effaced; these areas smooth and shining. Color as in darker workers; gaster reddish-brown. Weber recorded the length of the gynetype female as 2.3 mm., and his measurements of this species correspond in general with my own. The description here is taken from a dealate queen in the colony from El Palmar (see below).

Material examined: One nidotypic worker kindly sent by Dr. G. C. Wheeler. Worker cotypes and gynetype in Weber Coll.; I was not able to see any of the actual cotypes due to Dr. Weber's absence in the Arctic at the time I was studying this group.

Type locality: Talia Farm, Estrella Valley, Costa Rica (G. C. Wheeler; No. 29).

A small series of workers from Estrella Valley, Costa Rica (W. M. Mann).

Several series of workers making up the cotype series of *S. skwarrae* Wheeler [MCZ, USNM, etc.] collected by Elizabeth Skwarra at Tlacocinctla (*skwarrae* type locality) and Mirador, Vera Cruz, Mexico. Miss Skwarra's collections were made chiefly in the epiphyte *Tillandsia streptophylla*, where she found nests containing 250-300 workers. Stray workers were also found in other plant cavities (loc. cit.).

A colony, thought to be nearly complete, containing about 110 workers and 3 dealate females, nesting in the spathe of an aroid vine growing against a tree trunk a few feet above the ground at El Palmar, 16 km. west of Tetzonapa, Vera Cruz, Mexico (F. G. Werner). This locality lies at some 600 feet in altitude and is a jungle area with rubber and coffee plantations.

S. epinotalis is apparently a common species in southern Mexico and much of Central

America. It is somewhat intermediate between the "typical" members of the *schulzi* group and other New World *Smithistruma* species in sculpture and development of the spongiform appendages and infradental lamellae. A good distinguishing character is the arcuate "secondary margin" of the pronotum, made conspicuous by the rather isolated band of squat, whitish spoon-shaped hairs it bears.

Smithistruma (*Smithistruma*) *alcgrensis* new species

= *emiliae* !

Pl. II, fig. 22

Holotype worker: TL 1.95, HL 0.50, WL 0.48, CI 79, MI 20, ICD 52. Habitus of *schulzi* group, but with evenly rounded free clypeal border and shining postpetiolar dorsum. Head broad and thick; including mandibles, triangular; posterior excision moderate; preocular laminae feebly convex, decidedly convergent and passing in one continuous line to the tips of the closed mandibles on each side. Eyes at about the midlength of the head, oval with about 5 facets in the greatest diameter, not protruding at the sides when the head is viewed from a directly dorsal position. Viewed from the side, the dorsal cephalic outline is feebly convex anterior to vertex with a very weak depression just posterior to the clypeus. Median region of verticociput with a very superficial impression. Clypeus only weakly convex, a very narrow depressed apron or margin along the anterior part of the free border; the latter broadly and continuously rounded, without distinct traces of anterolateral angulation. Posterior clypeal border forming a blunt right angle, the border itself distinct. Mandibles weakly depressed and broadened, the blades converging to a rather bluntly rounded apex at full closure; in lateral view, this truncate appearance is seen to be caused by the strong deflection of the tips of the mandibles at almost a right angle. For mandibular shape and dentition, see fig. 22.

Normally exposed portion of antennal scape about 0.24 mm. long, evenly curved at the basal third (angle 35° - 40°), with broadly rounded anterior border; incressate, but not so strongly as in *schulzi*, *orchibia*, *studiosi*, etc. Funiculus 0.40 mm. long; apical segment making up slightly more than $\frac{1}{2}$ the total length; segment I slightly longer than IV; II about as broad as long; III shorter, transverse; II + III shorter than IV.

Alitrunk slightly depressed, resembling that of *margaritae*, with a continuous, gently convex dorsum not interrupted by metanotal groove; the latter present only as a dark line seen in dorsal view. Propodeal dorsum distinctly broader than long. Propodeal teeth slender, compressed, acute, elevated and divergent, about $\frac{3}{5}$ as long as the distance between the centers of their bases. Infradental lamellae narrow, thin, areolated and slightly convex and broadened near their ventral ends. Petiolar node approximately as long as or very slightly shorter than its peduncle; anterior nodal face sloping; posterodorsal nodal face about $\frac{2}{3}$ as long as broad, with a straight anterior edge and slightly concave sides. Ventral petiolar spongiform appendages present only as extremely fine vestiges; posterior transverse collar narrow, broadening somewhat at the sides to form moderate rounded lobes. Postpetiole transversely elliptical $\frac{3}{5}$ as long as broad, convex dorsally, the free dorsal surface not punctulate, but very feebly, loosely and indefinitely longitudinally substriate, more or less shining, especially in the middle; appendages moderately well developed, but the anterior sides free and the posterodorsal isthmus broken in the middle. Gaster with a fairly well developed anteroventral pad and a fine subspongiform anterodorsal margin. Gastric costulae distinct, parallel, but only about $\frac{1}{5}$ the length of the basal gastric tergite; remainder of the gaster smooth and shining, with scattered indistinct punctures. Sculpture otherwise as in typical *schulzi* group members, the head, alitrunk and petiole densely punctulate and opaque throughout.

Cephalic pilosity consisting entirely of broadly spoon-shaped hairs, larger and more distinct than in *orchibia*, *studiosi*, etc., the broadened portions bent so as to closely parallel the supporting surface, directed toward the midline. Hairs on clypeal disc very small, spatulate, subappressed; those on the free border larger, linear-spatulate, about 6 on each side of the center, weakly curved medially. Hairs on anterior scape border 8 in number, all except the two small ones at the apex broadly spoon-shaped. Hairs of alitrunk like those of head, but fewer; a hair on each humerus is slightly larger than those around it, but is subreclinate and not really differentiated. Hairs on nodes and gaster conspicuous (on gastric dorsum .05 to .07 mm. long), spatulate, inclined posteriorly; placed 4 on petiolar node, 8 on postpetiolar node, 6 or 7 transverse, irregular rows of about 4 each on the basal gastric tergite and a single row of 4 smaller, finer hairs on each of the succeeding exposed segments.

Color pale ferrugineous yellow.

Holotype selected from a series of 14 workers (13 are paratypes) from Porto Alegre, Rio Grande do Sul, Brazil (P. Buck). The holotypes and several paratypes are to be returned to the collection of Father Thomaz Borgmeier; two of the 14 specimens (paratypes) were received through Sr. Mario Consani, and will be returned to his collection. All of the specimens examined apparently came originally from the same nest.

Paratypes: 13 specimens with the same data as for the holotype. TL 1.90-2.06, HL 0.50-0.52, WL 0.47-0.54, CI 76-81, MI 18-22. Mandibular dentition constant in three specimens dissected. Pale to medium ferrugineous yellow. In addition to the dispositions listed above, paratypes have been placed in the MCZ, USNM, ANS. Male and female unknown.

Apparently closely related to *emiliae*, but the postpetiolar sculpture and possibly also the mandibular dentition distinctive.

SMITHISTRUMA (SMITHISTRUMA) EMILIAE (Forel)

Strumigenys emiliae Forel, 1907, Ann. Mus. Nat. Hung. 5:11-12, worker. *Strumigenys* (*Cephaloxys*) *emiliae* Emery, 1922, Gen. Ins. Fasc. 174:325.

Worker: Forel's description leaves little doubt about the group to which this species belongs, since he mentions the entirely punctulate body, with only the gaster smooth and shining. He also specifically mentions that spongiform appendages are present on both nodes, but "not under the peduncle of the petiole." Although he places the species in the *baudieri* group, he also states, "... related to *margaritae*, but distinguished by its wider head and shining abdomen." He gives the length as "1.8 mm.," but considering his other measurements against known specimens, we should probably consider the length in terms of the TL used here as about 2.0 mm. Following are some excerpts from Forel's original description considered to be significant for the present purposes, adapted to the present terminology:

"Mandibles shorter than clypeus. Clypeus slightly wider than long, with arcuate anterior border. Eyes at midlength of head, not visible from dorsal view. Alitrunk very feebly convex; promesonotal suture indistinct; metanotal groove distinct; dorsal profile continuous. Pronotum laterally submarginate; mesonotum and propodeum marginate. Dorsal face of propodeum subquadrate, as broad as long, slightly narrowed posteriorly. Propodeal teeth almost horizontal, distinctly divergent, acute, slender, $\frac{3}{4}$ as long as the space between their bases. Infradental lamellae small, areolate. Petiolar node low, short, much wider than long, convex behind, truncate anteriorly; peduncle at least twice the length of the node. Postpetiolar node almost twice the width of the petiolar node.

"Densely reticulate-punctulate, opaque, including scapes and propodeal declivity. Gaster smooth and shining; short longitudinal costulae at base. Brilliant sessile spoon-shaped hairs dispersed quite regularly over head and thorax; on scapes and free clypeal border more nearly pedunculate. Legs and gaster with long-pedunculate, less broadened hairs, erect on gaster, grading into ordinary appressed and subappressed hairs also dispersed over body and limbs. No erect hairs on tibiae.

"Entirely dull yellowish-testaceous, a little darker on head and alitrunk."

Type presumably in the Hungarian National Museum. Male and female unknown. *Type locality:* Asunción, Paraguay (Vezényi).

I have not been able to examine specimens of this ant, which seems from the description to be related to the species just described as *alegrensis*.

SMITHISTRUMA (SMITHISTRUMA) STUDIOSI (Weber)

Strumigenys (*Cephaloxys*) *studiosi* Weber, 1934, Revista de Ent. 4:44-45, fig. 5, worker.

Worker: Weber's original surmise that this ant is closely related to *margaritae* was correct; however, it is even more closely related to *schulzi*, *orchibia*, and other more "typical" members of the *schulzi* group. I have seen a single worker from the type nest through the courtesy of Dr. G. C. Wheeler, and the measurements and proportions are taken from this specimen: TL 1.97 (Weber states that the total length of the type series is 1.9 to 2.1, and his measurements are usually quite accurate), HL 0.52, WL 0.52, CI 77, MI 18, ICD 50. Except for size, color and relative head width closely similar to *orchibia*, the next species described below, although the eyes in *studiosi* are not visible from a position directly dorsal to the head (in my specimen). Weber's figure shows the eyes rather

prominently protruding at the sides; in my specimen, the eyes are smaller, with only about five facets in the greatest diameter; this may be due to normal variation within one nest series. This single nidotype differs from Weber's figure (as do most other *schulzi* group species) in having the clypeus more nearly subpentagonal, with a more transverse anterior border. Compared with my specimen, Weber's figure shows longer, more slender and more crooked hairs fringing the occipital lobes, and the hairs of his clypeal fringe seem to be too narrow.

Studiosi is smaller and more slender throughout relative to the total length than is *orchibia*, and the metanotal groove is even less distinct. The two small hairs on the anterior angles of the petiolar node are erect. The basal gastric costulae are interspersed with fine striae like those of *orchibia*, running longitudinally and occupying about 1/3 of the basal gastric tergite. Posterior to the striated area, the basal tergite is very superficially and irregularly shagreened throughout, with scattered shallow punctulae. This sculpture appears almost like a secretion instead of a true integumental feature, but since Weber also mentions it for his five cotype specimens, it may possibly be reckoned as a constant and permanent character. The posterior half of the segment is weakly but distinctly shining in spite of the shagreening, which is rather patchy in its concentration in any case.

Infradental lamellae of propodeum slightly wider and more convex below than in *orchibia*; postpetiolar node almost twice as broad as long. Color ferruginous yellow, the thorax a bit lighter than the head and gaster.

Other than those mentioned, I can detect no differences of perceptible degree between *studiosi* and *orchibia*. The pilosity, petiolar proportions and development of spongiform appendages closely similar. The mandibles have not been dissected, and these may show additional differences between the two forms. Male and female unknown.

Types are in the collection of Dr. N. A. Weber. *Type locality*: Sixaola River, Limon Province, Costa Rica (G. C. Wheeler). No other collections are known to me.

Smithistruma (Smithistruma) *orchibia* new species

Pl. II, fig. 24

Holotype worker: TL 2.28, HL 0.60, WL 0.60, CI 71, MI 17, ICD 47. With the general characters of the *schulzi* group, in which it is the largest and one of the most deeply pigmented members. Dorsal cephalic profile straight from vertex to posterior clypeal angle, the latter slightly raised. Eyes at the midlength of the head, distinctly protruding at the sides in full face view of head, only moderately convex, each with about 6 facets in its greatest diameter, oval in shape. Preocular laminae straight and approximately parallel. Clypeus of the usual subpentagonal shape; anterolateral angles bluntly rounded and anterior border transverse and straight; posterior angle blunt. Clypeal surface nearly plane, weakly raised in the center to the small suboval tumulus. The shining tumular surface may be seen just posterior to the center of the anterior border; at the level of its posterior section, a dark, weakly arcuate transverse line connects the two lateral clypeal angles and marks the posterior border of the weakly differentiated anterior apron.

Mandibles broad and strong, somewhat depressed, only very feebly arched and the tips only very weakly deflected ventrad; at full closure, the lateral borders continue the outline of the sides of the clypeus. Dentition as in figure 24. Antennal scape as normally exposed 0.26 mm. long, broadly incrassate, the greatest breadth at about the basal third, gently curved near base; anterior border lamelliform, cultrate, strongly convex, ending in a small subangular apical process. Posterior scape border gently concave at basal bend, beyond this nearly straight. Funiculus about 0.42 mm. long; apical segment 0.25 mm. long; segment I slightly longer than IV, but much more slender; IV about equal to II + III; II slightly longer than broad; III broader than long.

Pronotum depressed, only feebly convex, anterior border marginate and broadly rounded, without humeral angles or median carinula, but feebly submarginate along the sides. Mesonotum virtually indistinguishably fused with the pronotum, the suture extremely indistinct. Mesonotum gently convex and in profile virtually continuous with the feebly convex propodeal dorsum, only a very feeble dip occurring at the shallow, obsolescent metanotal groove. Propodeal teeth stout, triangular, about 2/3 as long as the distance between the centers of their bases, weakly divergent. Infradental lamellae thick and fairly broad, but rather deeply excised just below the teeth.

Petiole node large and heavy, slightly longer than its peduncle, subquadrate both in dorsal and lateral views; seen from above, the free dorsal face about $5/6$ as long as broad, very nearly as long as the free postpetiole disc; sides convex and anterolateral angles rounded. Posterior transverse spongiform collar of petiole node poorly developed, slightly widened at sides; ventral band represented by a very minute posterior vestige. Postpetiole subreniform, anterior border straight and posterior border with the usual weak median emargination; most of lateral surfaces free of spongiform tissue, strongly convex; transverse posterior band only moderately well developed and very tenuous in the center; ventral lobes fairly well developed. Gaster convex above, with moderately well developed anterodorsal spongiform border. Basal costulae very fine and numerous, giving the effect of fine, regular striolation taking up nearly the entire anterior half of the basal tergites. This striolation has bilateral origins along the anterior border, the more median elements curving inward to form a complete arch with similar elements of the other side (compare with paratype variation), while the more lateral striation continues posteriad. Posterior half of basal tergite and remainder of gaster smooth and shining, with scattered piligerous punctures. Rest of body, except weakly shining mandibles and funiculi, densely punctulate-granulose and opaque.

Ground pilosity of head and clypeus consisting of numerous but small and separated subappressed spatulate hairs, directed anteriorly and often a trifle obliquely away from the midline. Clypeal border with a fringe of larger, more nearly spoon-shaped hairs, 9 on each side of the midline, those on the anterior border smaller than those on the sides. 8 hairs on anterior scape border; nos. 1-5 broadly spatulate; 1, 2, 7, 8 directed apicad, the rest directed basad. A rather prominent spoon-shaped hair, bent anteriorly, on each dorsal scroble border a little posterior to the level of the eyes. Alitrunk with a very few small, quite inconspicuous appressed and subappressed spatulate hairs. One or two small, narrow subappressed spatulate hairs on each side of the declivity of the petiole node. In addition, a number of short, stout erect spatulate or clavate hairs occur in definite positions: a transverse row of 4 on the posterior occiput, one on each lateral occipital border at the end of the scroble, one each on the paired low humeral and mesonotal tubercles, a pair on the posterior dorsum of the petiole node, 6 (small) on the postpetiole dorsum, and about 18 scattered rather evenly over the basal gastric tergite. These hairs vary in length from about 0.3 to 0.7 mm. Apical segments of gaster with a few smaller, more slender, erect clavate and subclavate hairs.

Color deep orange-brown; legs, mandibles and antennae a bit lighter and more yellowish.

Holotype [USNM] taken in U. S. Plant Quarantine at San Francisco from an orchid plant, *Cattleya mossiae*, shipped from Caracas, Venezuela, the exact locality of collection unknown. Label with quarantine no. SF 20295.

Paratypes: 28 workers with the same data as for the holotype, and apparently of the same nest. TL 2.16-2.37, HL 0.60-0.63, WL 0.60-0.65, CI 70-73, MI 16-17. Slight variation in size of propodeal teeth and lamellar excision. Erect hairs of postpetiole 6-8, of basal gastric tergite, 16-20. Basal striolation of gaster highly variable in direction, many individuals differing from the holotype in that the striae are not bilaterally grouped and not arched, but instead are straight and parallel as in other *Smithistruma* species. In all specimens, however, the same extraordinary fineness of this sculpture holds constant, as does the amount of space it takes up on the first tergite of the gaster. Color variation very slight; a few individuals show slight infuscation of the dorsum of the head. Paratypes in USNM, MCZ, etc. Female unknown.

Allotype male: TL (omitting extruded genital capsule) 2.38, HL 0.47, WL 0.68, CI 76, full length of a mandible 0.13 mm., greatest diameter of eye 0.19 mm., distance from anterior ocular border to mandibular insertion 0.7 mm. In direct dorsal view, posterior occipital border straight. Clypeus convex in both directions, with a narrow, slightly depressed apron along the free border. Cephalic dorsum with a feeble median furrow running from anterior ocellus to a point just posterior to the level of the antennal insertions. Mandibles subfalcate, narrow, the apparent basal and apical borders meeting very close to the apex in a distinct subdentiform angle, the apical border therefore very short and weakly concave; at moderate magnifications, this set of circumstances causes the apex of the mandible to appear obliquely truncate.

Alitrunk robust, humped; mesonotum convex, notauli fairly distinct anterolaterally, but indistinct at their point of juncture; parapsidal furrows distinct; scutellum convex.

Prescutum with a feeble median furrow; scutum without carinula or striation. Petiolar node low, with a gradually sloping anterior face. Ventral longitudinal spongiform band of petiole present as a straight, even, whitish ribbon, narrow but distinct; posterior collar reduced to two tiny posterolateral vestiges. Postpetiole about twice as broad as long, slightly shorter than petiolar node, but much broader. Postpetiolar spongiform masses as in worker, except that the posterior transverse band and its lateral extensions are not so well developed. Propodeal teeth very small, but fairly acute; infradental lamellae very narrow.

Both nodes, entire gaster, and greater part of the sides of the alitrunk smooth and shining; remainder of body densely punctulate. Thorax, antennae and nodes deep yellowish-brown, the upper part of the alitrunk, especially the parapsidal furrows, infuscated; head brownish-black, the clypeus lighter ferruginous anteriorly; gaster castaneous; legs, mandibles and genitalia dull yellow.

Forewing about 2.0 mm. long; veins $R + Sc$, stigma, R_{5+6} , M_{1+2} , $M + Cu$, CuA , and $2r$ clearly defined and well pigmented; $Rs + Rs + M$ very weak, scarcely pigmented. Volsella of genitalia quite constant in 3 males dissected (alloparatypes); shape very similar to the figure given by Weber for *Smithistruma* (*Platystroma*) *depressiceps* in his 1934 paper (fig. 14c). The alloparatypes number 18 individuals, taken with the allotype and holotype from the same orchid plant. TL 2.32-2.61; color often deeper than in allotype, the dorsum of the alitrunk sometimes entirely blackish-brown. Most of the specimens had the genitalic capsules almost wholly extruded, but closed, adding an average of 0.25 mm. to the measurements as given. Allotype in USNM; alloparatypes distributed as the paratypes.

Smithistruma (*Smithistruma*) *castanea* new species

Holotype worker: TL 1.91, HL 0.52, WL 0.53, CI 77, MI 15, ICD 46. Very close to both *orchibia* and *studiosi*, the color more as in the former and the size and head more as in the latter. Occipital excision broad and rather shallow. Preocular laminae feebly convex, slightly converging. Eyes each with about 7 facets in the greatest diameter, not visibly protruding when the head is seen from a directly dorsal view. Dorsal outline of head in profile weakly convex between vertex and posterior clypeal angle. Clypeus only very slightly broader than long; shape as in *orchibia* except that the anterior border is extremely shallowly, almost imperceptibly concave when viewed from a directly dorsal position. Antennal scape 0.22 mm. long, funiculus 0.38 mm. long; antennae entirely similar to those of *orchibia* and *studiosi*, except that the scape seems to be a trifle more incrassate than in either of these species.

Alitrunk as in the two related species, the metanotal groove scarcely interrupting the continuous, gently convex dorsal profile. Propodeal teeth rather large, nearly as long as the distance between the centers of their bases; infradental lamellae continuous with teeth, but receding, causing the teeth to be broadly triangular. More ventrally, the lamellae are of moderate and even width, following the concave declivity, not enlarged at ventral extremities. Petiole as in *orchibia*, the node truncate anteriorly, scarcely broader than long, as long as the postpetiolar node; the latter subreniform, approximately twice as broad as long. Ventral spongiform appendages of petiole completely lacking; posterior collar reduced to a very narrow vestige without enlargement of lateral lobes. Postpetiolar appendages similar to those of *orchibia*, but slightly reduced in size.

Sculpture as in *studiosi* and *orchibia* except for gaster; basal costulae fewer and more irregular, with some very indistinct striations between, running longitudinally and occupying not more than the basal $\frac{1}{4}$ of the first gastric tergite. Remainder of gaster smooth and shining.

Ground pilosity of upper cephalic dorsum distinctive; hairs small, distinctly inverted-spoon-shaped, each raised on a short but nearly vertical peduncle, the broadened portion bent so as to parallel the integumental surface and directed obliquely toward the cephalic midline. The hairs are slightly larger and fewer and not so nearly appressed as in the two close relatives, and the direction of the pilosity on the head is immediately distinctive when the three forms are compared. Special erect hairs and fringes of scapes and free clypeal border much as in *orchibia*.

Color dark reddish brown, the head and gaster slightly darker than the alitrunk; legs, mandibles and antennae ferruginous yellow.

Holotype one of five workers intercepted in U. S. Plant Quarantine, No. EQA

432835, bearing also the following data: "Colombia, 10-1-37. On orchid pseudobulb." Deposited in USNM.

Paratypes: The remaining 4 workers taken with the holotype. TL 1.86-2.11, HL 0.52-0.55, WL 0.53-0.56, CI 75-77, MI 15-17. Color in 2 individuals slightly lighter than in holotype, more as in *orchibia*, but alitrunk still usually lighter than head and thorax. Basal gastric costulae 1/4 to 1/3 the length of the basal gastric tergite. Deposited in USNM and MCZ. Male and female unknown.

SMITHISTRUMA (SMITHISTRUMA) SCHULZI (Emery)

Strumigenys schulzi Emery, 1894, Bull. Soc. Ent. Ital. 26:213-214, Pl. 1, fig. 7, worker. *Strumigenys schulzi* Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24:148, worker, in key. ? Mann, 1916, Bull. Mus. Comp. Zool. Harvard 60:453. *Strumigenys* (*Cephaloxys*) *schulzi* Emery, 1922, Gen. Ins. Fasc. 174:325.

Worker: Emery's diagnosis of this ant consists of a short absolute description in Latin, a comparison in Italian against *margaritae*, and an extremely sketchy figure. This adds up to a fair characterization, but one which requires supplementation because of the very close new species described since. I have selected points from Emery's diagnosis which seem significant, adapting them to the terminology used here.

The length is given as "1½ mm." Since Emery's measurements are usually slightly under those I give as TL for other dacetine species, a probable TL for *schulzi* might be about 1.65-1.75 mm. From the figure, which is very crude, one might expect that the CI would be close to 80. Occipital lobes bulging laterally and broadly rounded; preocular laminae converging. Clypeus much as in *orchibia*, as is also the degree of incrassation of the scapes. Funicular segments II, III, and IV are described and figured as transverse, or not longer than broad.

Schulzi is stated to differ from *margaritae* in smaller size, shorter, more robust head and alitrunk, broader scapes, smaller propodeal teeth, presence of moderate infradental lamellae, presence of vestigial posterior petiolar spongiform collar and moderately well developed lateral and ventral spongiform appendages on the postpetiole. Basal gastric tergite "smooth and shining posteriorly; opaque, punctulate, and with a few striae anteriorly. Curved hairs of head a little better developed than in *margaritae*." Color testaceous; head, alitrunk and both nodes opaque.

Female and male undescribed. *Type locality:* Pará (Belem) Brazil (A. Schulz), "under bark of a tree." Types in Emery Coll.

Mann determined as this species some specimens taken at the type locality, but these specimens are not presently in the collections of either the USNM or the MCZ.

A light ferruginous specimen taken by F. Nevermann at Hamburg Farm, Santa Clara Prov., Costa Rica, agrees well with the supposed *schulzi* dimensions and other characters, but the head is narrower and the proportions of the funicular segments are not quite as described by Emery: TL 1.75, HL 0.50, WL 0.48, CI 73, MI 11. The color is light ferruginous yellow. Probably this form merits description as a new species, but I have accidentally broken the gaster off in examining it. In view of the closeness of *schulzi*, more material should be gathered before characterizing any such forms.

SMITHISTRUMA (SMITHISTRUMA) MARGARITAE (Forel)

Pl. II, fig. 20

Strumigenys margaritae Forel, 1893, Trans. Ent. Soc. Lond. p. 378, worker, female, male. *Strumigenys margaritae* Emery, 1894, Bull. Soc. Ent. Ital. Pl. 1, fig. 6, worker. Wheeler, 1908, Bull. Amer. Mus. Nat. Hist. 24:148, worker, in key. Forel, 1912, Mem. Soc. Ent. Belg. 19:198. Mann, 1920, Bull. Amer. Mus. Nat. Hist. 42:430. *Strumigenys* (*Cephaloxys*) *margaritae* Emery, 1922, Gen. Ins. Fasc. 174:325. M. R. Smith, 1931, Ann. Ent. Soc. Amer. 24:692-693, Pl. 2, fig. 7, worker. *Strumigenys* (*Trichoscapa*) *margaritae* M. R. Smith, 1947, Amer. Midl. Nat. 37:587.

Worker: TL 2.01-2.18, HL 0.53-0.58, WL 0.53-0.56, CI 69-73, MI 17-20, ICD 50-52. Measurements taken from 23 workers, representing at least 7 different colonies and including a cotype and representatives from localities in the West Indies and the southeastern United States.

Although known for a longer time and quite common in many parts of its range, *margaritae* is a rather atypical member of the *schulzi* group. Both Emery's and Smith's

figures show the head shape fairly well, though the anterolateral angles of the clypeus in Smith's figure and the mandibles in Emery's figure are shown differently from those of specimens before me, which include not only the West Indian and North American material measured, but also specimens from Colombia and southern Mexico. Emery's representation of the clypeal shape and the antennal scapes appears more realistic, though crudely drawn, than does that of Smith. Neither figure shows the mandibular dentition anywhere near correctly, and since this is an important character, I have depicted it in fig. 20. The pilosity in Smith's figure is rather good, although my specimens seem to have the individual hairs smaller and more abundant. Six specimens from Texas, Chiapas, and the Lesser Antilles show exactly the same mandibular dentition and pilosity. Eyes as in Smith's and Emery's figures, distinctly protruding at the sides in dorsal view of head; antennal scrobes shallow and poorly defined. The hairs of the alitrunk are similar to those of the head, but longer and less abundant. Alitrunk without definite humeral angles; dorsal profile continuous, gently convex; metanotal groove weakly depressed, seen as a fine dark line from dorsal view. Propodeal teeth nearly or quite as long as the distance between the centers of their bases, compressed-spiniform, slightly elevated and diverging. Infradental lamellae reduced to fine cariniform ridges.

Petiolar node approximately as long as its peduncle, seen from above, considerably broader than long, with a sloping anterior face. Postpetiolar node convex and about twice as broad as long, more than half again as broad as the petiolar node. Petiolar spongiform appendage reduced to the merest vestige of a posterior collar. Postpetiolar appendage reduced to a rather small ventral mass and a posterior transverse belt of moderate width, the latter not broken in the middle. Anteroventral pad of gaster vestigial.

The basal gastric costulae are not lacking, but are small and short, not so evident as in some related species. The gastric surface both dorsally and ventrally is sculptured differently from all other *Smithistruma*, but in much the same way as some *Strumigenys* species like *louisianae*, etc. The gastric sculpture is basically composed of very small, densely packed shallow punctures, on the first tergite with distinct but very fine longitudinal superimposed striolation. Except for certain insignificant highlights reflected from the minute elements of this sculpture, the surface may be said to be totally opaque. Head, alitrunk, legs, antennae and nodes densely punctulate and opaque.

Numerous small, subappressed spatulate hairs on head and alitrunk, directed mesally. Longer spatulate hairs of nodes and gastric dorsum rather numerous, obliquely inclined posteriorly. The only really erect hairs on the body are two forming a pair, one arising perpendicularly on each side just lateral to the infradental lamella near its mid-length; these small hairs narrowly spatulate and feebly curved. Color ferruginous yellow.

Female, dealate: The females of this species differ somewhat from the workers in general habitus and also vary more than is usual among themselves. Two specimens from Alabama are here recorded separately: Gulf State Park, Baldwin Co. (E. O. Wilson), TL 2.48, HL 0.60, WL 0.64, CI 64, MI 20, ICD 63. Bryce Lake, Tuscaloosa Co., TL 2.85, HL 0.64, WL 0.74, CI 68, MI 22, ICD 60. The convexity of the vertex is very marked, and the posterior excision is very shallow, appearing almost straight in directly dorsal view. Antennal scapes slightly broader than those of the worker and more angulate basally; mandibles relatively more massive. Hairs on occiput longer, some often suberect, and many of those on the mesonotum suberect and posteriorly inclined. The propodeal teeth may have apices ventrally deflected at their apices, or may be straight. The Bryce Lake specimen has the mesokatepisternum smooth and shining, while in other females, the sides of the alitrunk may be punctulate and opaque throughout. The gaster, while densely and shallowly punctulate throughout, lacks the striation seen in the worker. Color yellowish to medium ferruginous; ocellar area variably, but usually deeply infuscated.

Male: Described by Forel; none seen during the course of the present work. Types of all castes are in the Forel Coll., and worker types are also in various North American and European Museums. The cotype in the MCZ is designated as *lectotype*, designation present.

Type locality: St. Vincent, B. W. I. (H. H. Smith).

Material examined: One cotype worker and small series from the following localities: Antigua and Montserrat, B. W. I. (N. A. Weber). Nassau, Bahamas Is. (W. M.

Mann). Mobile, Baldwin and Tuscaloosa counties, Alabama (E. O. Wilson). Comal Co., Texas (C. F. Baker). New Braunfels, Texas (W. M. Wheeler). Palenque Ruins, Chiapas, Mexico (C. J. Goodnight). Rio Porce, Colombia, 1020 M. (N. A. Weber).

Remarks: Forel has also recorded this species from Martinique. Dr. M. R. Smith has suggested that it may occur as a tramp species in the U. S. This is also my own opinion, but it is possible that *margaritae* had a circum-Caribbean distribution even in pre-Columbian times. The affinities are quite certainly with the Neotropical *schulzi* group, and not with any Nearctic form.

According to H. H. Smith (in Forel, loc. cit. 1893), *margaritae* is a rather common ant on St. Vincent, usually nesting in the sod layers covering rocks. The colonies at this locality were estimated to contain up to 250 individuals. One of the nests was taken in an open place at the foot of a tree. In Alabama, Mr. Wilson took the two solitary dealate females already mentioned in October and November, and also captured a stray worker from leaf litter. Dr. Goodnight found this species in soil samples in Chiapas. Thus it appears that *margaritae* does not share the arboreal tendencies shown by the other members of the *schulzi* group, in spite of the large, protruding eyes and other characters which would seem to fit it for life in epiphytes. *Margaritae* is easily recognized by its finely but distinctly and entirely sculptured gaster and by the extreme reduction of its infradental lamellae.

ORNATA GROUP

Smithistruma (*Smithistruma*) *hypnata* new species

Holotype worker: TL 2.04, HL 0.56, WL 0.58, CI 63, MI 15. Outline of head from dorsal view and shape of clypeus much as in *S. dietrichi* of North America. Posterior occipital excision moderate; occipital lobes only weakly laterally expanded; preocular laminae subparallel, weakly convex, not forming a definitely continuous outline with the anterior converging borders of the occipital lobes, but approximately continuous with the sides of the clypeus and on to the apices of the closed mandibles. Center of verticociput with a shallow but fairly distinct median impressed area. Eyes very small, each with only about 4 to 6 pigmented facets, situated at the posterior third of the head length against the dorsal side of the cariniform ventral border of the antennal scrobe. Mandibles small and only moderately broad, viewed in place and closed like those of *S. dietrichi*. A third specimen (paratype) belatedly received from Dr. Weber permits a better characterization of the dentition than was previously possible.

Basal lamellae translucent, acutely triangular, with an acute internal spine reaching to apex; long diastema between the triangular portion of the basal lamella and the first tooth of the apical series, but this diastema almost completely filled in by a broad, straight-edged distal extension of the basal lamella; this extension almost as broad as the first three teeth of the apical series are long. The apical series follows the extension directly, and is distinctive in the proportionate lengths of the teeth. Nos. 1 to 3 subequal, rather stubby, but with acute apices; no. 4 much shorter than the first three; no. 5 very long and slender, much the longest tooth of the series and subequal in length to the basal lamella. Beyond this long tooth are several shorter, slender teeth becoming gradually shorter toward the apex; the number not exactly determinate, but estimated to be about 7 counting the apical tooth. All of the teeth of the apical series appear to have more or less acute apices.

Antennal scapes in repose reaching to about the posterior quarter of the head length, about 0.42 mm. long, nearly straight, slender at base and feebly fusiform, with the greatest thickness slightly distad of the midlength. Antennal funiculus about 0.64 mm. long; apical segment nearly or quite as long as I-IV taken together; II and III about equal and nearly as broad as long, but together not as long as I; IV about as long as I and much thicker.

Alitrunk distinctive, rather ruggedly modelled; promesonotum somewhat depressed, in profile appearing weakly and irregularly convex. Seen from above, the anterior margin distinct (but short and concave) only across the base of the rather strong, depressed neck. Oblique pre-humeral margins feebly concave and terminated by strong, bluntly tuberculate humeral angles; posterior to which the dorsolateral promesonotal borders are weakly convex and converging posteriorly to the mesonotal tubercles, faintly marginate. Promesonotal sulcus just barely suggested by a feebly darkened area. Weak median longitudinal carinula extending from pronotum onto neck and mesonotum. Posterior portion of mesonotum narrowed and impressed, the impression moderate, but in profile appearing abrupt

due to the sudden posterior decline of the two prominent, compressed dorsolateral mesonotal tubercles. Mesonotal impression terminated posteriorly by the weak metanotal groove; the latter not affecting the profile because the entire impressed region is bordered on each side by a weak, slightly irregular, but continuous cariniform border. Just anterior to the metanotal groove, the posterior mesonotal border is transversely indistinctly carinate; where the transverse border meets those of the sides of the dorsum on each side, there is raised a small piligerous tubercle. Propodeal dorsum anteriorly rising slightly but abruptly from the metanotal groove, its surface weakly convex anteriorly, but sloping off rather steeply to the declivity behind; dorsolateral margins distinct and continued posteriorly as the propodeal teeth. Teeth long and acute, about as long as the distance between the centers of their bases, compressed and lamelliform, their dorsal edges curving slightly dorsad toward the apices, divergent. Infradental lamellae reticulate, broadest at the bases of the teeth and gradually narrowing below, not widened at their ventral extremities.

Petiole pedunculate, with a moderately high, rounded node; nodal summit set off by a feeble carinula running all the way around near the top; anterior face on each side with a low lamelliform carinula running up from the peduncular dorsum and forming a tiny point or corner on its side of the anterior summit where it meets the encircling carinula. Between the two points so formed, the portion of the encircling carinula is stronger, dividing the convex disc of the summit from the sloping anterior nodal face. Seen from above, the disc of the summit is about as broad posteriorly as it is long, the sides arcuate and converging anteriorly, posterior border arcuate, anterior border or carinula transverse and very short. Ventral spongiform border about as deep as the peduncle itself; posterior of node on each side with a thin, leaf-like flap of vesicular spongiform tissue, the two flaps connected across the posterior surface of the node by a very narrow, thin lamelliform collar or isthmus. Postpetiole in dorsal view with dorsal disc subcircular, a little broader than long and about $1\frac{1}{3}$ times as broad as the petiolar node, strongly convex, punctulate, opaque, with about 4 distinct, complete, transversely oriented costulae or rugulae. Spongiform appendages luxuriant; posterodorsal isthmus broad, but narrowed in the middle.

Gaster as in other *Smithistruma*, with lamelliform-spongiform pad on anteroventral face; basal costulae coarse and separated, about 15 in number, extending about $\frac{1}{4}$ or slightly more the length of the basal tergite; remainder of gaster smooth and shining. Clypeus rather coarsely granulate and opaque; punctulation of head, alitrunk and nodes relatively coarse; occipital region and dorsum of promesonotum with very feebly superimposed rugulation; sides of posterior half of alitrunk smooth and shining. In addition to the larger lateral mesonotal tubercles already mentioned, there is a pair of small tubercles on the anterior mesonotal dorsum near the sides, each one extended anteriorly and posteriorly for a short distance as a feeble longitudinal carinula.

Pilosity consisting practically entirely of long to extremely long flagellate or subflagellate hairs, not particularly numerous, but so long and often intertangled as to suggest a sparse growth of fungal hyphae (given recognition by the name *hyphata*). Hairs on clypeus mostly very feebly thickened or at least obtuse apically, 12 to 14 very long ones directed outward, mostly laterally, but with the tips looping entirely back or nearly entirely back to the clypeal surface by way of broad dorsal curves. Anterior extremity of clypeus with a curious close-set group of 4 small hairs, directed anteriorly, the extreme tips curved ventrally. The small carinal lobes over the antennal insertions each with a long, straight tapered hair directed posteriorly and somewhat laterally. Upper dorsum of head with sparse long and very long filiform hairs, recumbent and mostly directed posteriorly; lateral border of each occipital lobe with two very long, fine, outstanding, straggling flagellate hairs. Dorsum of alitrunk with a sparse growth of fine subappressed shorter hairs and several bilaterally paired, very long, crooked or recurved flagellate hairs, the latter arising from the four pairs of tubercles already mentioned on the alitrunk. The pair of hairs arising from the posterior mesonotal tubercles are shorter than the other three pairs. Nodes and gaster with long and medium-long, weak flagellate hairs, sparsely arranged, and mostly arching back to the integumental surface. Antennal scapes with a few slender appressed hairs; legs with slender appressed or reclinate hairs.

Color even medium ferrugineous; antennal funiculi and parts of legs a bit lighter and more yellowish.

Holotype [Weber Coll.] collected with two paratypes in the foothills north of Tunapuna, Trinidad, B. W. I. (N. A. Weber; catalog no. 180). The paratypes are closely

similar to the holotype, and one, when measured, did not differ in dimensions by more than the expected error. [MCZ]

This species is entirely different from all the other known South American *Smithistruma*. The habitus, which recalls that of the *ornata* group of the Nearctic Region, is perhaps supported by the mandibular dentition in placing this species nearer to *dietrichi* than to any other known form. *Hyphata* is distinct enough on several counts to warrant placement in a separate group, but until the Neotropical fauna is much better known there is no harm in grouping it with the species to which it seems most closely related.

Subgenus *Platystroma* new subgenus

Strumigenys (*Cephaloxys*) Fred. Smith, *sensu* Weber, 1934, Revista de Ent. 4:47, part. *Smithistruma* (*Smithistruma*) Brown, 1948, Trans. Amer. Ent. Soc. 74:105, part.

Worker: Head extremely depressed, the index of cephalic depression (ICD) not more than 31. Mandible with a broad translucent basal lamella; number of teeth in apical series reduced, all acute. Alitrunk depressed. Otherwise as in *Smithistruma* (*Smithistruma*).

Subgenotype: *Strumigenys* (*Cephaloxys*) *depressiceps* Weber.

SMITHISTRUMA (PLATYSTROMA) DEPRESSICEPS (Weber)

Pl. II, fig. 18

Strumigenys (*Cephaloxys*) *depressiceps* Weber, 1934, Revista de Ent. 4:47-50, figs. 6, 14c, worker, male.

Worker: Weber described and figured this ant rather thoroughly in the original reference. Two cotypes were measured and found not to differ significantly from one another except in exposed length of mandibles: TL 2.70-2.72, HL 0.80, WL 0.77, CI 65, MI 12-13. Greatest depth of head at the weak occipital convexity, about 0.24 mm.; ICD 30 in both specimens.

Clypeus about half as long as the width across the occipital lobes and just about exactly as wide as long. Length of scape 0.28 mm. Head dorsally with a broad, shallow median depression of the vertex; occiput weakly convex. Labral lobes long, depressed, rod-like and subparallel, reaching at least $\frac{3}{4}$ the distance to the mandibular apices and themselves truncate or strongly blunted apically. Mandibles as in the figure, not with rounded basal lamina as Weber states in his description.

Numerous short, fine, erect truncate hairs on the dorsal body surfaces except clypeus, which has extremely fine, short, obliquely erect hairs on the disc, these invisible in most angles of view even at high magnifications in strong light. Hairs on free clypeal border numerous, small and finely spatulate, curved medially, those on the sides of the clypeus longer than those on the center of the anterior portion of the border and larger than as shown in Weber's figure.

Male: Described and the volsella figured satisfactorily by Weber in the original reference.

Type locality: Kartabo, British Guiana (W. M. Wheeler). The type series was taken from a cavity in a rotten log. Types in MCZ.

KEY TO THE WORKERS OF SMITHISTRUMA S. STR.*

1. Sides of at least the posterior half of the alitrunk largely smooth and shining 2
Sides of alitrunk completely or very nearly completely and densely punctulate 7
2. Clypeus with very long (approximately as long as clypeus itself) subfiliform hairs directed away from the center, but strongly recurved dorsomesad, the apices returning toward the center of the disc (other body hairs fine and filiform; habitus that of *ornata* group; Trinidad) *hyphata* n. sp.
Clypeus with much shorter ($\frac{1}{3}$ or less the length of clypeus), spatulate or spoon-shaped hairs, appressed or reclinate on the clypeal disc and forming an even fringe on its free border 3
3. Mandibles long, MI over 25, very nearly or quite as long as the clypeus. (CI 77

* This key applies to species of the Neotropical Region.

- or more; mandibular dentition as in fig. 17; Vera Cruz to Bolivia, Lesser Antilles *alberti* (Forel)
- Mandibles shorter, MI less than 25, distinctly shorter than clypeus; (CI less than 77; mandibular dentition diverse, never as in fig. 17) 4
4. Alitrunk completely or nearly completely smooth and shining, dorsally without distinctly punctulate areas; MI 16-17; HL over 0.55 (S. Brazil) *sublucida* n. sp.
- At least the mesonotum and dorsum of propodeum with punctulation distinct and dense; MI 19 or over; HL usually less than 0.55 5
5. Propodeal teeth long, straight and slender, the infradental lamellae reduced to mere fine carinae (entire pronotum punctulate; basal mandibular lamella narrowly rounded apically; Argentina) *consersa* (Emery)
- Propodeal teeth involved basally with the more or less raised and distinct infradental lamellae (pronotum usually with sculpture either partly effaced or partly substriated) 6
6. Free posterodorsal face of petiolar node approximately as long as broad and as long as the free postpetiolar disc (preocular laminae nearly or quite parallel; anteromedian section of pronotum nearly or quite smooth, except for median carinula, shining; dentition as in fig. 21; S. Brazil) *friderici-mülleri* (Forel)
- Free posterodorsal face of petiolar node considerably broader than long and about 2/3 the length of the free postpetiolar disc (preocular laminae decidedly converging anteriorly; pronotal punctulation overlain by variably distinct longitudinal striation; dentition as in fig. 15; Central America, Greater Antilles) *nigrescens* (Wheeler)
7. Ventral appendages of petiole present and distinctly spongiform, fairly well developed; infradental lamellae broad, convex below (dentition as in fig. 23; tropical Mexico to Central America) *epinotalis* (Weber)
- Ventral petiolar appendages entirely obsolete or present as very fine cariniform vestiges; infradental lamellae vestigial or narrow and concave 8
8. Propodeal teeth slender and very acutely tapered, their infradental lamellae obsolete and represented only by fine carinae; basal tergite of gaster distinctly, very finely and densely striolate-punctulate, opaque (mandibular dentition as in fig. 20; West Indies, S. U. S. to Colombia) *margaritae* (Forel)
- Propodeal teeth broader at their bases, involved with the low but not cariniform infradental lamellae; basal tergite of gaster with anterior striation or costulation, but posteriorly smooth or indistinctly shagreened, strongly to weakly shining 9
9. Pilosity of head and dorsum of alitrunk of uniformly large, curved spoon-shaped hairs; no erect, bilaterally paired specialized hairs; sculpture of postpetiolar disc very feeble, partly effaced, the surface more or less shining (mandibular dentition as in fig. 22, S. Brazil) *alegrensis* n. sp. \approx *emelia*
- Pilosity of head different, usually with a few differentiated erect hairs on occiput and alitrunk; postpetiole distinctly and densely punctulate-granulose, opaque 10
10. Size larger: TL over 2.15, HL over 0.58, CI 70-73 (color dark; dentition as in fig. 24; Venezuela) *orchibia* n. sp.
- Size smaller: TL under 2.15, HL under 0.58, CI usually over 73 (color light or dark, varying with species) 11
11. Species of which specimens were examined for this revision: TL 1.80-2.10, HL 0.51-0.55, CI 75-79, MI 15-18; free posterodorsal face of petiolar node not or only extremely slightly broader than long 12
- Species of which specimens were not available for this revision, characterized according to the original descriptions: TL same as above or distinctly smaller; free posterodorsal face of petiolar node distinctly broader than long 13
12. Ground pilosity of verticociput appressed or subappressed, the hairs numerous, small, spatulate, mostly directed anteriorly and not obliquely medially; color ferrugineous yellow (Costa Rica) *studiosi* (Weber)
- Ground pilosity of verticociput consisting of small inverted spoon-shaped hairs, mostly directed sharply obliquely toward the midline; color deep reddish-brown, the head and gaster darkest; appendages yellowish (Colombia) *castanea* n. sp.
13. Size small, TL probably under 1.90, HL probably 0.51 or less (see discussion in text. Amazon Basin) *schulzi* (Emery)
- Size probably agreeing better with couplet 11, lug A (see discussion in text. Para-

guay) *emiliae* (Forel)

The single known species of *Platystroma*, *P. depressiceps*, is easily distinguished from the species in the key above by virtue of its broad, extremely depressed head, this more strongly flattened than in any other species of ant known to me.

INDOMALAYAN, PAPUAN AND OCEANIAN SPECIES OF SMITHISTRUMA

CAPITATA GROUP

Tropical Asian, Papuan and Oceanian species resembling the Neotropical species *alberti* and *nigrescens* in many details. Nine species are here recognized, of which several are doubtfully distinct. One of these, *mumfordi* Wheeler, is insufficiently described, and may well belong to some genus other than *Smithistruma*. The other eight species can be divided into two subgroups on the basis of size.

1. Small species: *karawajewi* Brown, *dubia* new species.
2. Large species.
 - a. Papuan-Philippine species; propodeal dorsum weakly convex: *capitata* Fred. Smith, *pedunculata* new species.
 - b. Indomalayan species; propodeal dorsum flat: *dohertyi* Emery, *lamellignatha* new species, *inezae* Forel and *taipingensis* Forel.

The species of subgroup 1 are quite distinct from the others and from one another. The species in subgroup 2 are a different story, and it is only after the greatest difficulty that I have been able to state their probable placement in this group. The oldest species, *capitata*, was first described from the female; Emery later gave a hasty description and figure of the worker, but I have not been able to see any specimen of this caste. I have described a second species (*pedunculata*) in section 2a, although I realize that the workers of the two species are at best only very slightly different. Differences in the *pedunculata* female, which was directly compared with the type of *capitata*, seem more significant, and I have therefore decided that at least one form of this section should bear a certainly applicable name until better collections are available for study.

In section 2b, much the same situation exists. I have described *lamellignatha* from Borneo in order that the worker, female and male of at least one species of this subgroup should be adequately described and unequivocally associated. Actual specimens of the other three 2b species had not originally been seen by me, and since the original descriptions of these forms were each inadequate or questionable in some important respect, I was hard put even to be sure that I had placed them to the correct genus.

Only just before writing this, I have managed to gain information concerning *taipingensis* which shows beyond a doubt that it is a 2b form, though I still cannot say whether it should be synonymized with one of the other forms. Still more recently, I have had the rare good fortune of being permitted to see the *dohertyi* holotype. *Dohertyi* differs only very slightly from *lamellignatha*, showing that the eventual treatment of all 2b species may be as slight, non-taxonomic variants of one species ranging from Burma to Java and Borneo and bearing the prior name *dohertyi*. Such treatment is presently blocked by our lack of complete knowledge of the two forms *inezae* and *taipingensis*, which are described as having smooth and shining postpetioles. The

postpetiole in both *lamellignatha* and *dohertyi* is longitudinally striate (as also in *pedunculata* and *capitata*), and it would not be at all surprising to find that Forel had made one of his common mistakes in describing sculptural detail under the names *inezae* and *taipingensis*. His measurements are probably inaccurate.

Since these two species were each described from a single specimen, the types are not available for study, and that of *inezae* may be permanently lost. The status of these forms will have to be worked out on the basis of topotypic and other Indomayalan collections in this group. I have given below as much information about each of the species as I could obtain, and if this treatment will aid some future worker to synonymize Forel's species and *lamellignatha* under *dohertyi*, it will have served its primary purpose well enough.

I give here a general description applying to all the species of subgroup 2 that I have seen to date:

Worker: Large species; TL ranging from 2.35 to 2.85 mm. Head broadly cuneiform, with laterally expanded occipital lobes and strong posterior occipital excision, CI 76-84. Preocular laminae converging anteriorly and continuous with sides of clypeus and closed mandibles to form a nearly straight-sided V when head is viewed full face. Clypeus slightly but distinctly broader than long, with a broadly rounded free border; anterior portion of disc feebly depressed. Antennal scrobes deep and broad; eyes moderate in size, only weakly convex. Mandibles large, robust, weakly depressed and their apices only weakly deflected downward; nearly as long as to slightly longer than the clypeus (considering only the normally exposed mandibular length) and 1/4 to 1/3 as long as the head proper. Dentition probably similar in all species; identical in those seen for this revision, as in fig. 14. Antennal scapes gently bent at or near the basal third, varying somewhat in length and shape with the species. Funiculus of normal *Smithistruma* pattern; apical segment very slightly longer than segments I-IV taken together.

Promesonotum forming one strong convexity, with slight or no trace of humeral angles. Posterior mesonotum depressed; propodeum narrow, its dorsum low and plane or gently convex. Propodeal teeth moderate in size, acute; infradental lamellae reduced to low carinae. Petiole pedunculate, with a distinct node, varying somewhat in form with the species. Postpetiole broader than long, strongly convex; in the species seen for this revision, longitudinally striate. Spongiform appendages present and fairly well developed on and under both nodes. Gaster with a transverse anterodorsal margin of spongiform tissue; basal gastric costulae short but distinct. Gaster otherwise smooth and shining, as are also (usually) part at least of the mesopleura. Head, alitrunk, and appendages densely punctulate and opaque, except as noted.

Ground pilosity consisting of moderately abundant, rather inconspicuous subappressed spatulate hairs on head and promesonotum. Hairs of clypeal disc also sparse, subappressed, small and sublinear-spatulate, those on the free border a little larger, 7-8 on each side of the midline, rather uniform in size and not conspicuous, narrowly linear-spatulate and curved weakly anteriorly and medially. Hairs on anterior border of scape usually outstanding, slender, with spatulate or subclavate tips. Hairs 1 and 2 (before bend) rather short,

bent toward scape apex; 3 the largest hair, both it and 4 curved toward the base of the scape; 5 varying in direction with the species; beyond this, there are two or three apically curved, small slender hairs near the scape apex. Erect hairs of the "typical" pattern; a row of four stiffly erect, narrowly spatulate or subclavate hairs on the posterior occiput; in front of this, another row of the same, the two lateral hairs of this anterior row situated on the lateral borders of the occipital lobes and directed laterally. Each humerus bears a long, outstanding stiff or flagellate hair; two pairs on the mesonotum; two pairs on the petiolar and three pairs on the postpetiolar nodes, inclined posteriorly; 4-6 irregular transverse rows of about 4 hairs each on the gastric dorsum. With the exception of the flagellate humeral hairs of the *dohertyi* complex (section 2a), all the longer erect or suberect hairs of the body are weakly spatulate or subclavate at their apices. Color light to dark ferrugineous.

Female: Size larger overall than in worker, TL 3.1-3.6 mm. Differing from the worker chiefly in the usual sexual characters, although the head in at least one species (*lamellignatha*) is not relatively significantly wider than in the worker; the mandibles of all species known in this sex appear little if any shorter in relation to the head proper than in the worker caste. The form of the petiole is different from that of the workers, and differs in what seems to be a significant way among the species for which this sex is known.

Male: This sex certainly known and associated with workers only in *S. lamellignatha*, which see.

The two smaller species, *dubia* and *karawajewi*, are somewhat similar in general form to the members of subgroup 2, but in addition to the smaller size, they differ in having relatively shorter mandibles, those of *dubia* having quite distinctly different dentition. *Karawajewi* is a very small form according to the original description, and has a narrower clypeus and different pilosity.

The species of *Smithistruma* presently known from the region under consideration are considerably more like one another than are the forms of the two other widespread genera occurring there; *Weberstruma* and especially *Strumigenys* are represented in the area by very distinctly different species, showing that they have probably been differentiating there for a longer time. *Smithistruma* is not yet known from eastern New Guinea or Australia, while many species of *Strumigenys* are common throughout these regions. Although one or two species of *Smithistruma* have managed to get out into distant Pacific archipelagoes, they have probably done this only as tramps through the agency of human commerce. It therefore seems fairly certain that *Smithistruma* arrived in southeastern Asia much later than did *Strumigenys*; the East Indian fauna of *Smithistruma* has only begun to differentiate and expand there, and the relationships to the Mediterranean *baudueri* group and the Neotropical *alberti* group suggested by morphological similarities of certain species are quite possibly as close as they seem at a superficial glance.

Scarcely anything is known of the biology of the *capitata* group; most of the few records given indicate that the colonies are commonly taken in rotten logs, under bark, etc. The large species seem to fill the same ecological role as does *alberti* in the New World, while it may not be stretching the thin

evidence to say that *dubia* may parallel *nigrescens* in its ability to act as an insular tramp.

The large species of group 2 seem to be recorded entirely or nearly entirely from mountainous areas, and it may be that the few species represent populations entirely isolated from one another in this respect.

SMITHISTRUMA (SMITHISTRUMA) CAPITATA (Fred. Smith)

Cephaloxys capitata Fred. Smith, 1864, Journ. Proc. Linn. Soc. Lond. Zool. 8:77, Pl. 4, figs. 5, 5a, 5b, female. *Strumigenys capitata* Mayr, 1866, Sitzb. Akad. Wiss. Wien 53:517. Emery, 1887, Ann. Mus. Stor. Nat., Genova 25:44-45, Pl. 2, figs. 20, 21, worker, female, male. 1897, Term. Füzetek 20:576, worker, in key. *Strumigenys (Cephaloxys) capitata* Mann, 1921, Bull. Mus. Comp. Zool., Harvard 64:462. Emery, 1922, Gen. Ins. Fasc. 174:324. Donisthorpe, 1932, Ann. Mag. Nat. Hist. (s. 10) X:474. 1948, Psyche 55:80-81, female. *Smithistruma (Smithistruma) capitata* Brown, 1948, Trans. Amer. Ent. Soc. 74:105.

Holotype female, redescribed: TL 3.32, HL 0.67, WL 0.94, CI 88, MI (only one mandible, so this is an estimate) 23. Corresponds very well to the worker description given for subgroup 2, the larger species of the *capitata* group, but differing in the normal features of full sexuality. Eyes very large, elliptical, convex, about 0.18 mm. long in greatest diameter. The single remaining mandible is bent slightly inward; in normal position, it would probably not be more than $\frac{1}{4}$ the length of the head proper or much more than $\frac{3}{4}$ the length of the clypeus. The head is shorter and broader, and the mandibles markedly smaller, than in the gynetype of *pedunculata* (see below). Dentition of mandible easily seen, agreeing in detail with that of *pedunculata* (see fig. 14). Exposed length of antennal scape about 0.35 mm.; gently angled (about 35°), broadest just beyond bend, anterior border broadly rounded. Funiculus about 0.53 mm. in length, of which very slightly more than half is taken up by the apical segment; II + III a bit shorter than I or IV; II very slightly longer than broad; III slightly broader than long.

Alitrunk robust; with feeble median longitudinal carinula, almost imperceptible on the scutellum; the latter bluntly rounded behind in any view. Propodeal teeth thick, triangular, about as long as broad at their bases. Petiolar node seen from the side with a strongly rounded summit; peduncle thick, about half the length of the node; nodal declivity sloping from the peduncular dorsum at an angle of about 40° . Node seen from above 0.16 mm. long, 0.24 mm. broad; each side of anterior declivity with a feeble carinula running down onto peduncular dorsum. Posterior spongiform collar narrow, extending halfway up the sides of the node toward the anterior declivity as narrow, horizontal, sliver-like lobes; midventral strip moderately well developed. Postpetiole transversely elliptical, broadest posteriorly, disc strongly convex, with a distinct median posterior impression like that found in most *Smithistruma*. The disc is about 0.21 mm. long and about 0.34 mm. broad. The measurements of the petiole and postpetiole are subject to a maximum error of $\pm .01$ mm. Contrary to previous descriptions of this specimen by Smith and Donisthorpe, the postpetiolar disc is densely and finely longitudinally striate its length, but still more or less shining; sides of node with striation more or less effaced and more strongly shining. Spongiform appendages of the postpetiole are moderately well developed, but appear to have been partly torn away; probably Smith or some other early worker thought these represented foreign material fouling the surface. Gaster rather large; first tergite taking up more than $\frac{4}{5}$ the length; anteroventral pad and thin transverse antero-dorsal spongiform border present. Basal costulae about 20 in number, varying in length, but mostly distinct, the longest ones extending only about $\frac{1}{8}$ to $\frac{1}{7}$ the length of the basal tergite.

Head, alitrunk, petiole and appendages evenly and densely punctulate and opaque; mesepisterna smooth and shining. Pilosity largely rubbed off, but few remaining hairs show that the pilosity must have been much as in the worker and female of *pedunculata*.

Color deep ferrugineous; gaster slightly darker; ocellar triangle blackened; appendages lighter and more yellowish.

I owe the opportunity of seeing the type to the kindness of Professor Varley and Mr. Ernest Taylor of the Hope Department of Entomology at Oxford University Museum, in which institution the specimen now rests. Mr. Donisthorpe's redescription of 1948 is in error regarding several important features of this insect; since he published the redescr-

tion in order to facilitate this revision, I doubly regret having to take issue with him concerning these points.

Worker: Emery described and figured the head of the worker in 1887 (loc. cit.), and I am of the opinion that his determination is correct. His figure, when measured, shows a CI of about 86 and MI about 23, corresponding very closely to the same values for the female given above. This is significant in view of the fact that the workers and females of the other *capitata* group species I have seen show only slight differences in size and proportions of the head and mandibles. We may assume, I think, that the worker of *capitata* differs from that of *pedunculata* as does the female, i.e., the head is probably shorter and broader on the average, and the mandibles distinctly shorter. Emery mentions the longitudinally striate postpetiolar disc in his specimens. As much of the pilosity as is shown is like that of *pedunculata*, except that the hair on the anterior border of the scape corresponding to no. 5 in *pedunculata* is curved toward the scape base (this curved apicad in normal specimens of *pedunculata*). Mr. Donisthorpe (in litt.) has pointed out that the proportions of the funicular segments in Emery's figure do not correspond exactly to those of the type female. It seems to me, however, that this very slight difference may be put down as another of Emery's numerous draughting errors. Neither Emery nor Donisthorpe saw the broad basal lamella of the inner mandibular border; this is present in the type and in all of the other *capitata* group workers and females I have seen. Emery also mentions the depression of the "sutura meso-metanotale," which must therefore be distinct.

Male: The specimen described by Emery, stated to have been taken at the same locality as were the workers described in the same article, seems to me not to belong to *Smithistruma*. The notched structure of the ends of the mandibles and the shape of the eyes are so different from those of the surely-associated male of *lamellignatha* that I cannot believe two species with such similar workers would have such different males. Males of other species groups in this genus have proven very similar from species to species within one group. I believe that Emery's male belongs to some species of *Strumigenys*. The types of worker and male castes in Emery Coll.

Type locality: New Guinea (A. R. Wallace). Wallace apparently collected this insect somewhere on the western end of New Guinea. The type was the only specimen examined that could be referred to this species.

Emery's workers, female, and male were taken by Beccari at Ramoi, New Guinea. The records given below, published under the name "*Strumigenys capitata*," are considered as probable misidentifications based on some Indomalayan (section 2b) species:

Emery, 1901, Ann. Mus. Civ. Stor. Nat., Genova, XL, p. 691: Bua Bua, Engano I. (E. Modigliani). Santschi, 1928, Tijdschr. v. Ent., LXXI, p. 130: Boschreserve Bandar, Sumatra (J. B. Corporaal).

Capitata is apparently widespread in western New Guinea and neighboring islands. Collections of *Smithistruma* from areas such as Moluccas and Mindanao, between known ranges of *capitata* and *pedunculata*, should help to make clearer the relationships between these two very close forms.

Smithistruma (*Smithistruma*) *pedunculata* new species

Pl. I, fig. 14

Holotype worker: TL 2.49, HL 0.60, WL 0.65, CI 80, MI 27. Agrees well with the general characterization for the large members of the *capitata* group given above. The head is probably a little narrower than that of *capitata*, and the mandibles a little longer. The overall size is smaller than in *lamellignatha*, and the mandibles are relatively smaller, but the proportions of the head are about the same. Normal exposed length of antennal scape 0.32 mm. (paratypes: 0.31-0.33 mm.), bent near basal third at about a 35° angle, the anterior border weakly and obtusely angulate or subangulate. Incrassation rather strong, the greatest width of the scape coming a little beyond the bend, at about the second fifth of the scape length. Beyond the bend, the anterior scape border weakly convex, becoming feebly concave at the extreme apex. Alitrunk in profile with a very strongly convex promesonotum, concave posterior mesonotal depression, and gently convex propodeal dorsum. Propodeal teeth about half as long as the distance between the centers of their bases, acute and elevated.

Petiolar node low and broadly rounded in profile, slightly longer than its peduncle, with gently sloping anterior declivity. Seen from above, the node is as long or very

slightly longer than broad, subcircular, with convex sides, broadest posteriorly.

Median longitudinal carina of pronotum moderately distinct; shining area of mesopleura restricted to a narrow oblique band running along the anteroventral mesopleural border. Postpetiolar striation strong and distinct, noticeably more distinct than in *lamellignatha* or the *capitata* type. The postpetiolar surface is therefore duller and more opaque in most lights than in most other forms. Basal gastric costulae 14-17, extending $1/5$ to $1/4$ the length of the basal gastric tergite.

Erect hairs on dorsum of body long, stiff, but shorter and a little stouter than those of *lamellignatha*; posterior mesonotal pair ca. 0.10 mm. long; anterior mesonotal pair shorter than posterior pair; humeral hairs stiff, more or less flattened at tip and definitely not flagellate or subflagellate, as those of *lamellignatha* are. Of the hairs on the anterior scape border, no. 3 is not quite as long as the scape is wide at its widest point; hair no. 5 curved toward scape apex.

Color dull yellowish-ferrugineous.

Holotype selected from a colony-series taken at Camp 4-18-27, near Dumaguete, Negros Oriental, Philippine Islands (J. W. Chapman, cat. no. 1378) "from log in wet draw, April 1927." Placed in MCZ.

Paratypes: 44 workers taken from the type nest and from two other nests taken on different occasions in the vicinity of Dumaguete (J. W. Chapman, cat. nos. 1355, 1361). TL 2.43, HL 0.58-0.62, WL 0.65-0.72, CI 79-84, MI 25-29. Slight variation in length and form of propodeal teeth and in number and placement of erect hairs on gastric dorsum. Exposed mandibles averaging very slightly shorter than clypeus. One specimen with a small extra hair on the left anterior scape border between hairs no. 3 and 4, this small hair curved toward the scape base. Callows light yellowish-ferrugineous, older workers medium ferrugineous. Deposition in MCZ, Chapman Coll., USNM, ANS, Consani Coll., etc.

Gynetype female, dealate: TL 3.34, HL 0.69, WL 0.90, CI 85, MI 29. Differing from the worker in the usual ways. Scape 0.38 mm. long, shaped as in worker. Petiolar node low and rounded, the peduncle rather slender and about equalling it in length. Seen from above, the node only very slightly broader than long, with a very feeble impressed or flattened area in the middle of the posterodorsal face. Postpetiolar node about 0.35 mm. wide, $3/4$ again as broad as long and nearly $3/4$ again as broad as the petiolar node. Striation very fine, crowded but distinct, the surface weakly shining. Basal gastric costulae much coarser and larger than in the worker, extending about $1/3$ the length of the first gastric tergite. Katepisternum and anterior lobe of anepisternum (of mesothorax) smooth and shining. Median longitudinal carinula weakly indicated on scutum. Exposed length of closed mandibles about equal to the clypeus in length. Gynetype with the same data as for holotype, with which it is deposited. Male unknown.

Pedunculata quite definitely belongs to the eastern section of the complex (subgroup 2) of larger *capitata* group species. This section is distinguished from the western or Indomalayan section by the slightly smaller size, relatively smaller mandibles, shorter and broader scapes, convex propodeal dorsum and by the thickened humeral hairs. Within the eastern section, *pedunculata* is best differentiated in the female caste (because the *capitata* worker remains incompletely characterized) by means of the long-pedunculate, narrow petiole. The mandibles of both female and worker *pedunculata* appear to be longer, at least in the average, than those of *capitata*. A minor feature, but one which is used for the workers in the key, is the difference in curvature of the fifth hair on the anterior scape border. This rather feeble character depends on the accuracy of Emery's drawing of the worker *capitata*. Redescription of the *capitata* worker on a quantitative basis is urgently needed.

Smithistruma (*Smithistruma*) *lamellignatha* new species

Pl. III, fig. 33

Holotype worker: TL 2.80, HL 0.65, WL 0.77, CI 80, MI 28. See general description of large members of *capitata* group. Body large; mandibles approximately as long as the clypeus or very slightly longer. Antennal scapes long and slender, bent at an angle approaching 35° near the basal third; exposed length about 0.40 mm. Incrassation of scape very slight; anterior border distad of bend nearly straight, the anterior and posterior borders nearly or quite parallel from near the bend to near the apex, where the scape narrows slightly and gradually and is feebly curved anteriorly. Funiculus 0.59

mm. long, apical segment slightly longer than I-IV taken together.

Propodeal dorsum in profile very nearly straight, with only the merest feeble suggestion of convexity, continuous with the posterior mesonotum. Propodeal teeth straight, a little more slender and acute than in *pedunculata*, about 2/3 as long as the distance between the centers of their bases, gently elevated, scarcely divergent. Infradental lamellae reduced to fine carinulae. Petiolar node rather low and rounded, but with moderately steep anterior face; seen from above, node very slightly longer than broad and slightly but distinctly longer than its peduncle. Spongiform appendages slightly less well developed than in *pedunculata*. Postpetiolar node about 0.24 mm. wide, about 1 1/3 times as broad as long and about 1 1/2 times as broad as the petiolar node, strongly convex above, the longitudinal striation less distinct than in *dohertyi* or even than in *pedunculata*, almost completely effaced on the sides, but still quite evident even at moderate magnifications. Basal gastric costulae numbering about 15, very short, separated, occupying about 1/7 to 1/6 the length of the basal gastric tergite. Mesopleurae and the gastric dorsum except for basal costulae smooth and shining.

All body hairs longer, with tips slightly more broadly spatulate than in *pedunculata*, the posterior mesonotal pair 0.12-0.13 mm. long; humeral and lateral occipital paired hairs long and crookedly flagelliform. Of hairs bordering scape anteriorly, ncs. 3, 4, and 5 bent weakly basad, the rest curved toward apex.

Color clear yellowish-ferrugineous.

Holotype taken on Mt. Tibang, North Borneo, 1300 meters, in a rotten log (E. Mjöberg) with other workers and winged sexual forms described below. Holotype in MCZ.

Paratypes: [MCZ, USNM, etc.] Of a small group of workers taken with the holotype, several were headless, and some reached me too late for the proper measurements to be included here. Four individuals (workers) were fully measured, and the rest did not seem to vary very much from these. TL 2.72-2.83, HL 0.64-0.65, WL 0.72-0.78, CI 78-83, MI 28. Variation in length and degree of divergence of propodeal teeth present but very slight. Most individuals were a little darker than the holotype, medium ferrugineous with slightly darker gasters. Flagellate hairs of humeri often with the attenuated tips looped back and adhering "buggy-whip" fashion to the thicker part of the shaft, thus sometimes appearing falsely spatulate. Median longitudinal carinula of pronotum often indistinct, at best not very strongly developed.

Gynotype female, alate: TL 3.56, HL 0.75, WL 0.98, CI 78, MI 28. Length of forewing 3.35 mm. Exposed length of mandibles equal to length of clypeus. Petiolar node low and rounded, as long as its peduncle; carinula on each side of anterior nodal face distinct; seen from above, the node subtrapezoidal, about 0.21 mm. wide and about 1.25 times as broad as long. Postpetiolar node about 0.32 mm. broad and about 1.6 times as broad as long, more distinctly and coarsely striate than in the worker. Basal gastric costulae extending about 1/4 the length of the first gastric tergite, not so distinct as in the female of *pedunculata*, but a little more distinct than in the *capitata* type. Mesothoracic katapisternum and lower half of anepisternum smooth and shining. Color medium ferrugineous; head yellowish-ferrugineous, with ocellar triangle infuscated. Forewing with R + Sc, stigma, 2r, M + CuA, Mf₁ and Rsf₁ distinct, well defined and pigmented; Rs + M, r-m, Rsf₄ and Mf₄ present but poorly defined and scarcely pigmented.

Gynotype taken from the type nest; deposited in MCZ.

Three *paratype females* also taken from the type colony: TL 3.41-3.57, HL 0.73-0.75, CI 79-81, MI 28. Two specimens are wingless. Color medium to darkish ferrugineous, head not lighter than rest of body; interocellar space blackened. Deposited MCZ, USNM, etc.

Allotype male: [MCZ]. Taken with the holotype. TL 2.51, HL 0.47, WL 0.68, CI 77 (eyes not included in measurements of head width). Greatest diameter of eye about 0.18 mm., slightly greater than the full length of a mandible (0.14 mm.). Eyes nearly perfectly half-globose and strongly protruding. Mandibles reduced, but the simple, acute apices opposable; apical and basal borders separated by an obtuse angle. Petiole with a very low node, its summit seen in profile forming a long arc; seen from above, the node is 1 1/3 times longer than broad and nearly twice as long as its peduncle. Postpetiole seen from above subcircular, about as broad as long, the posterior border transverse. Both nodes with extremely fine cariniform traces of spongiform tissues, virtually obsolete, but apparently distributed as in the female castes. Both nodes finely granulose

on the sides, smooth and shining dorsally. Propodeal teeth represented by very low obtuse angles. Base of gaster with extremely short vestigial costulae, gaster otherwise smooth and shining. Head and alitrunk granulose-punctulate and opaque, except for the largely smooth and shining meso- and metapleurae. Head proper, pro- and mesonotum brownish-black; mesopleurae and parts of the body behind these castaneous; mandibles and genitalia lighter and more yellowish. Wings as in female, but shorter (2.6 mm.) and a bit darker in color; apical abscissa of M completely lacking. Another male from this collection (type nest) agrees well with the allotype except that the color is a little darker and the propodeal teeth a little better developed and more dentiform.

Distinguished in worker and female castes from *capitata* and *pedunculata* by size and proportions, especially of head, mandibles and antennal scapes, also by the scarcely convex propodeal dorsum; from *dohertyi* by the slightly longer, lower petiolar node, and presumably from *inezae* and *taipingensis* in having slightly (relatively) shorter mandibles and striate postpetiole.

SMITHISTRUMA (SMITHISTRUMA) DOHERTYI (Emery)

Strumigenys dohertyi Emery, 1897, Term. Füzetek 20:576, worker, in key and footnote. *Strumigenys (Cephaloxys) dohertyi* Emery, 1922, Gen. Ins. Fasc. 174:325. *Smithistruma (Smithistruma) dohertyi* Brown, 1948, Trans. Amer. Ent. Soc. 74:105.

Worker: Emery's description consists of a mere two lines in a key, totally inadequate for purposes of placing this ant. He states that the length is "2 1/3 mm." Fortunately, I have been able to see the type through the kindness of Dr. Delfa Guiglia of the Museo Civico di Storia Naturale at Genoa. The type has been returned to Genoa. TL 2.85, HL 0.67, WL 0.73, CI 76, MI 28. Antennal scape, exposed length, 0.36 mm., funiculus 0.54 mm.

The specimen is nearly identical to *lamellignatha* new species, described above, except that in *dohertyi* the petiolar node as seen from above (free portion) is distinctly but slightly broader than long. The long erect hairs of the gastric dorsum are a little longer and more slender, being scarcely enlarged apically, than in *lamellignatha*. Postpetiole distinctly and completely striate its length, subopaque; propodeal teeth stout and rather strongly diverging. Humeral hairs flagelliform as in *lamellignatha*. Mesopleurae covered with glue, so that their sculpture could not be determined. The holotype is labelled "Alta Birmania (Doherty)" and is in fairly good condition.

When more collections from the Indomalayan area are in, it may well be possible to show that *dohertyi*, *lamellignatha*, *inezae* and *taipingensis* are slight geographical or non-taxonomic variants of one species. In view of the widely different localities and the slight but seemingly constant differences shown by the few specimens I have seen, I think that it is best to regard these four forms as separate species for the time being.

SMITHISTRUMA (SMITHISTRUMA) INEAE (Forel)

Strumigenys inezae Forel, 1905, Mitt. Naturh. Mus., Hamburg 22:12-13, worker. *Strumigenys (Cephaloxys) inezae* Emery, 1922, Gen. Ins. Fasc. 174:325. *Smithistruma (Smithistruma) inezae* Brown, 1948, Trans. Amer. Ent. Soc. 74:105.

Worker: This species was described by Forel as "L. 2.4 mm., nahe *S. capitata* Sm." Circumstantial evidence indicates that the length in terms of TL would be well over 2.5 mm. Forel states that the head is much narrower behind than in *capitata*; the mandibles are described as longer than those of *capitata*, the propodeal dorsum as "flach," the petiolar node longer than broad, and the dorsum of the postpetiolar node "glatt." These features are enough to separate *inezae* from the other members of the *capitata* group, provided, of course, that Forel's description was accurate. I personally am a little skeptical of the statement concerning the "glatt" postpetiolar disc; I think it a least possible that this segment is striate as in other species, but with the sculpture slightly effaced in the middle. If such proves to be the case, we will need to reexamine the relationships of *inezae* and *lamellignatha*. The type was taken by K. Kraepelin at Tjibodas, Java, deposition in NM Hamburg. The type may have been destroyed during the war; it is definitely not in the Forel Coll. No second collection has been reported, and there are no specimens among those sent me by the Buitenzorg Museum.

Forel and Wheeler placed names on variants considered infraspecific to *inezae*, but I have removed these forms as separate species because of the evidence suggesting that they are not subspecies. The form named as *Strumigenys (Cephaloxys) inezae* var. *rudinodis*

by Starcke has no close relationship whatsoever to *inezae*; it is an independent species belonging to the genus *Weberistruma*.

SMITHISTRUMA (SMITHISTRUMA) TAIPINGENSIS (Forel)

Strumigenys inezae var. *taipingensis* Forel, 1913, Zool. Jahrb. Syst. 36:83, worker. *Strumigenys* (*Cephaloxys*) *inezae* var. *taipingensis* Emery, 1922, Gen. Ins. Fasc. 174:325.

Worker: Information received recently from Dr. H. Bischoff, including a camera lucida sketch of the head and measurements of head and mandibles made from the type (ZMUB), allows me to say that this form quite definitely belongs to the *capitata* group. According to Dr. Bischoff's measurements and figures, the CI of the type would be 80 or slightly more, and the MI a bit over 30; the absolute head length is given as about 0.6 mm. With this head length, one would expect the total body length to be closer to 2.5 mm. than to the bare 2 mm. quoted by Forel. The exposed length of the mandibles seems to be very slightly longer than the clypeus.

The original description, which consists of a very brief comparison against *inezae*, does not state whether the petiolar node is longer than broad and the postpetiolar dorsum smooth and shining, but it implies that the form is similar to *inezae* in these respects. When more information is available concerning this species, we may be able to synonymize it with *dohertyi*. At present, the distinguishing characters seem to be the long mandibles and the size, which is stated by Forel to be definitely smaller than that of *inezae*. Of course, the measurements of *inezae* do not seem to be trustworthy, so we shall have to wait for further examination of the type or for further Indo-Malayan collections to find out what relationship *taipingensis* has to the other members of the *capitata* group. *Type locality*: Maxwell's Hill near Taiping, Malaya, from the rotten wood of an old tree, 4000 feet altitude (H. von Buttel-Reepen).

Smithistruma (Smithistruma) dubia new species

Pl. I, fig. 13

Holotype worker: TL 2.12, HL 0.52, WL 0.52, CI 80, MI 23. Head shape as described for the larger species of the *capitata* group as seen in dorsal view. Clypeus half as wide (width ca. 0.20 mm.) as the width across the occipital lobes. Head seen from side with dorsal profile strongly convex at the vertex and forming a nearly straight line anteriorly to the tips of the mandibles, the anterior part of the head in this view (with mandibles) enclosing an angle of about 40°. Median longitudinal sulcus and median depression of cephalic dorsum feeble and indistinct. Eyes as in the larger species, with about 6 facets in the greatest diameter, situated at about the midlength of the head on the dorsal side of the ventral scrobe border. Mandibles porrect, robust but somewhat depressed; relatively shorter than in the larger species. Dentition of a paratype shown in fig. 13; teeth nos. 1, 4 and 6 can be seen in the process of forming lamellate extensions of their borders so as to become rounded (compare with Pl. II, figs. 15, 17 and 20). The parallel development of this dentition shows the great difficulty one encounters in attempting to unravel phylogenetic lines among the higher dacetines. Antennal scape short (ca. 0.25 mm. long) and rather thick, bent at an angle of about 35° near its basal third, and beyond this incrassate, thickest near midlength; funiculus ca. 0.39 mm. long, the apical segment accounting for half this length; segments I and IV nearly equal in length; both individually longer than II + III; III transverse, II not longer than broad.

Alitrunk robust, forming approximately equal, gentle and even promesonotal and propodeal convexities separated by a weak, shallowly concave depression of the extreme posterior mesonotum; metanotal groove feebly indicated at the posterior end of this depression. Pronotum with a sharp, broadly rounded anterior margin, without humeral angles, but humeral piligerous tubercles weakly developed. Promesonotal sutural line very feebly indicated, scarcely depressed. A rather coarse median longitudinal carinula extends the full length of the promesonotum. Propodeal teeth moderate in length, half or slightly more as long as the distance between the centers of their bases, laterally compressed, with apices strongly acute and curved feebly dorsad; infradental lamellae narrow but distinct, concave (following the sides of the declivity) and not sensibly broadened ventrally.

Petiole with a long, slender petiole, distinctly longer than the small subglobose node; the latter very slightly broader than long. A pair of faint carinules extend down the sides of the gentle anterior nodal slope and run onto the peduncle; posterolateral spongiform

lobes fairly broad, connected by a narrow posterodorsal collar; ventral longitudinal spongiform band fairly well developed. Postpetiole transversely elliptical, its disc strongly convex and very nearly twice as broad as long; nearly twice as broad as the petiolar node; its surface when clean smooth and shining, with a few weakly indicated short longitudinal striae or costulae along the extreme anterior border. Spongiform appendages quite voluminous and finely areolated ventrally; posterodorsal isthmus narrow, with a straight posterior border. Gaster "normal" in shape, only extremely slightly depressed dorsally, with an anteroventral pad and a thick transverse anterodorsal spongiform border. Basal costulae 15-17, short but distinct, extending only about $1/6$ the length of the basal tergite; those in the middle even shorter. Gaster, like sides of posterior alitrunk and dorsal disc of postpetiole, smooth and shining. Body otherwise densely punctulate and opaque.

Ground pilosity of head and alitrunk consisting of sparsely arranged, small, whitish, subrecumbent spatulate hairs. On clypeus, similar hairs more numerous and crowded, more easily seen, but still small and subappressed; those on the free clypeal border larger, somewhat spoon-shaped, 7-8 on each side of the midline, curving anteromedially, shortest in the middle anteriorly and forming a narrow fringe. Anterior scape border basad of bend with two broad spatulate hairs curved apically; bend with a longish spatulate hair curved basad, as is also the more slender hair next beyond; one or two smaller hairs beyond these, curved apicad. Dorsal surfaces of mandibles thickly set with small, appressed, linear squamose hairs. Six erect, weakly clavate hairs on the posterior dorsum of the head, arranged as described for the larger species; lateral occipital hairs (one on each side) slender, bristle-like, truncate at apices, a similar pair on the humeri; a single stout, erect spatulate hair on each side of the mesonotum. Petiolar node with small anterior and larger posterior spatulate pairs, inclined posteriorly, and the postpetiole with about six weakly clavate and spatulate hairs, similarly directed. Gastric dorsum with about 4 rows of 4 erect, weakly clavate hairs each, the anterior row situated at the posterior edge of the narrow band of basal costulae, inclined slightly anterior; second row near posterior border of basal tergite and directed posteriorly; a row each on the next two segments are also posteriorly inclined. Apex of gaster with a few weak tapered hairs. In general, the erect hairs are relatively shorter and less conspicuous than in the larger species of the group. Sting long, acute.

Color deep ferrugineous; mandibles and appendages slightly more yellowish.

Holotype worker [CMNH] taken in a log on the East Coast, Peleliu Island, Palau Group, southwestern Pacific Ocean, August 4, 1945 (H. S. Dybas).

Paratypes: A worker taken with the holotype (same date) and three other workers taken on Garakayo Island, Palau Group, August 6 and 8, 1945 (H. S. Dybas). Two of the Garakayo workers were taken together in leaf mould.

TL 1.91-2.14, HL 0.50-0.52, WL 0.50-0.53, CI 78-83, MI 21-24. Variation in color and other features negligible. Deposition in CMNH and MCZ.

Gynotype female, dealate: TL 2.48, HL 0.56, WL 0.62, CI 80, MI 24. Scutum with indistinct longitudinal rugulation. Petiolar node obliquely depressed from above and from the front; posterodorsal face about twice as broad as long, with a straight anterior border. Katapisternum and anteroventral lobe of anepisternum smooth and shining. Inner surfaces of ocellar calluses narrowly blackened; general body color deep ferrugineous. Allowing for normal differences of full sexuality, the female is very much like the worker.

Gynotype described from a solitary dealate female taken "under bark" on the East Coast, Peleliu Island, August 3, 1945 (H. S. Dybas); deposited in CMNH. Male unknown.

The records kept by Dybas indicate that this ant is at home in a relative variety of nest sites. It is very probably a tramp species originating from the larger Papuan or East Indian land masses to the south and west. I have named this species *dubia* because of the possibility that it is the same ant that Wheeler described under the name "*inezi* subsp. *mumfordi*." According to Wheeler's puzzling and entirely inadequate description, *mumfordi* would differ from the present species in being much smaller still ("about 1 mm."), and in having the gastric dorsum shagreened. These would certainly seem to be adequate differences for separating the two forms, but Wheeler's descriptions are so often hopelessly inaccurate that the possibility of synonymy must be considered until someone has the opportunity to examine the *mumfordi* types.

SMITHISTRUMA (SMITHISTRUMA) KARAWAJEWI (Brown)

Strumigenys (*Cephaloxys*) *emeryi* Karawajew, 1935, *Treubia* 15:106-108, fig. 25, female; not *Strumigenys emeryi* Mann, 1922. *Strumigenys* (*Trichoscapa*) *karawajewi* Brown, 1948, *Ent. News* 59:44, as nom. nov. *Smithistruma* (*Smithistruma*) *karawajewi* Brown, 1948, *Trans. Amer. Ent. Soc.* 74:105.

Female: I have not been able to examine a specimen of this ant, of which only the original specimen has been reported. Karawajew's original description and figures, however, seem to be good enough to place it as a distinct species close to those in the *capitata* group. The original description states of the length "with head outstretched scarcely more than 2 mm." If accurate, this would make the worker probably smaller than that of *dubia*. Head "1.23 times as long as broad," or, if converted to the terms used here, CI 81. Measurement of Karawajew's figure shows a CI of about 79, so we may perhaps assume that the original measurement and figure are fairly accurate. MI calculated from the figure 18-19, or distinctly less than in *dubia*. The postpetiole is described as "rather smooth and shining," and the figures show that this segment is quite similar in form to that of the female *dubia*. Clypeus as portrayed about as long as or slightly longer than broad, and the hairs on the free clypeal border a bit more prominent than in *dubia* or the larger species. The free clypeal border is also much more narrowly rounded than in *dubia*, *capitata*, etc., and the anterior part of the head more like that of *baudueri* than like any other Indo-Papuan species I have seen. The character that most impresses one as distinctive, however, is the pair of large, erect, apparently feebly spatulate hairs arising from the dorsum of the head a bit behind the level of the antennal insertions; the figure shows no other long hairs on the posterior part of the cephalic dorsum. While one might assume that the occipital hairs had once been present and have since been rubbed off, the middorsal pair is nevertheless in a position different to the erect hairs of any other *Smithistruma* known to me. Wings figured in the original description. In several respects, *karawajewi* seems as though it might be considered intermediate between the more typical members of the *capitata* group and those of the European *baudueri* group.

Known only from the supposed type locality: Siak, Sumatra (O. John). Present location of type unknown.

SMITHISTRUMA (SMITHISTRUMA) MUMFORDI (Wheeler) *nomen dubium*

Strumigenys (*Cephaloxys*) *inezi* [sic] subsp. *mumfordi* Wheeler, 1932, *Bishop Mus. Bull.* No. 98:160, worker.

Worker, original description in entirety: "Length about 1 mm. Even smaller than the variety *taipingensis* Forel from Malacca, but very similar in form and proportions. Erect club-shaped hairs on the abdomen longer; head covered with evenly-spaced, white, squamiform hairs, which are decidedly coarser than those on the clypeus. Gaster shagreened, only slightly shining, the basal half of the first segment dark brown."

Everything about this description is vague and confusing, and I am extremely doubtful about the accuracy of the total length given. On this occasion, Wheeler stated the comparison with *taipingensis* exactly as though he had a specimen of the latter before him at the time. However, there is every reason to believe that he had never seen a specimen of either *taipingensis* or *inezae*, for there are none in any existing part of his collection, and no further collections beyond the single type specimens of each of these forms have been reported. Even Forel did not have specimens in his collection! This comparison against an insect never seen was an unfortunate habit of Wheeler's that he by no means rarely executed.

The comparison, then, must have been again the description of *taipingensis*, but even this description is so very brief (and misleading in dimensions stated) that Wheeler could have gained not a grain of useful information from it. Scarcely more could have been gained from the description of *inezae*, which even now does not allow generic placement with complete certainty. From what is now known about *taipingensis* through Dr. Bischoff (see above), we cannot allow *mumfordi* to remain associated with it or with *inezae*. Unfortunately, I have not been able to examine the *mumfordi* types in the Bishop Museum at Honolulu due to the absence of the curator there. For the present, we cannot consider it certain that *mumfordi* is a *Smithistruma*, although Wheeler's description of the pilosity makes this seem likely.

Type locality (by present restriction): Hakahetau Valley, 2500 feet, Uapou, Marquesas Islands (A. M. Adamson), one worker.

An additional locality, one of the two original ones, is Ooumu, 4050 feet, Nukuhiva, Marquesas Islands (Mumford and Adamson), one worker.

KEY TO WORKERS OF SMITHISTRUMA*

1. Head length without mandibles (HL) less than 0.55 mm. 2
- Head length without mandibles (HL) more than 0.55 mm. 3
2. Clypeus broader than long, its free border broadly rounded; occiput in undamaged specimens with 8 prominent outstanding hairs (Palau Is.; possibly a tramp species) *dubia* n. sp.
- Clypeus not broader than long, its free border rather narrowly rounded; prominent erect hairs on dorsum of head apparently limited to a single pair situated slightly anterior to cephalic midlength (Sumatra) *karawajewi* (Brown)
3. Propodeal dorsum in profile straight or very nearly so, continuing to the posterior depressed portion of the mesonotum without sensible interruption; long humeral hairs flagellate. See note at end of key 4
- Propodeal dorsum in profile feebly convex; metanotal groove weakly but distinctly impressed below highest point reached by propodeum; humeral hairs stiff and narrowly spatulate at apices. See note at end of key 5
4. Petiolar node slightly broader than long (Burma) *dohertyi* (Emery)
- Petiolar node slightly longer than broad (Bornco) *lamellignatha* n. sp.
5. Fifth hair from the base of the anterior scape border curved toward scape apex; MI usually slightly more than 25 (Philippines) *pedunculata* n. sp.
- Fifth hair from base of the anterior scape border curved toward scape base; MI probably rarely more than 25 (E. New Guinea, etc.) *capitata* (Fred. Smith)

Note: The species *inezae*, *taipingensis* and *mumfordi* are not included in the key because inadequately known. The first two species would probably key out to *lamellignatha*, from which they are both supposed to differ, according to the original descriptions, in having smooth and shining postpetiolar discs. For further information on these species and on *pedunculata* vs. *capitata*, see discussions in the text above. *Mumfordi* is also discussed in the text above; any small *Smithistruma* taken in the Polynesian islands may belong to Wheeler's species, which is inadequately described. *Capitata* and *karawajewi* are keyed from probable worker characters as deduced from the females.

SMITHISTRUMA S. STR. OF THE ETHIOPIAN REGION

EMARGINATA GROUP

To date, there are only four species of *Smithistruma* known from Africa south of the Sahara, and two of these are recently described as new. While very diverse in form, all of these species show apparent relationship to the *rostrata* group, and they are separated more on a geographical than a morphological basis from *rostrata* and its allies. The Ethiopian forms examined have rather fully and acutely dentate mandibles, and where the basal structure is clear, there is little or no trace of diastemation. The anterior clypeal border is transverse to very deeply emarginate.

The species *emarginata* and *cavinasis* are strongly aberrant and easily recognized. *Transversa* is known to me only through the original description, which is rather ambiguous concerning certain important features. *Truncatidens* is a more "typical" *Smithistruma*, but has a very distinctive basal mandibular lamella.

The relative scarcity of *Smithistruma* species in Africa appears to be due chiefly to the presence in the same region of the decidedly more ubiquitous and dominant forms of the genus *Serrastruma*. There are roughly 20 times as many records known to me for African *Serrastruma* as for *Smithistruma*,

* This key applies to species of the Indo-Malayan, Papuan and Oceanian regions.

and I believe that this situation demonstrates less effective competition by the *Smithistruma* species in food-getting, the prey presumably being Collembola.

Smithistruma species may be distinguished from *Serrastruma* by the mandibles, which are shorter than the clypeus in the four known forms and which possess an armature of less than 15 teeth, all acute and not even in length, on the inner mandibular border.

SMITHISTRUMA (SMITHISTRUMA) EMARGINATA (Mayr)

Pl. 1, fig. 11

Strumigenys emarginata Mayr, 1901, Ann. Naturh. Hofmus., Wien 16:26-27, worker. *Strumigenys (Trichoscapa) emarginata* Santshi, 1913, Bull. Soc. Ent. France, p. 257, worker, in key. *Strumigenys emarginata* Arnold, 1917, Ann. S. Afr. Mus. 14:379, worker. *Strumigenys (Cephaloxys) emarginata* Emery, 1922, Gen. Ins. Fasc.: 174:324. *Smithistruma (Smithistruma) emarginata* Brown, Trans. Amer. Ent. Soc. 74:105.

Worker: TL 2.45-2.56, HL 0.63-0.68, WL 0.61-0.64, CI 59-62, MI 17-19, ICD 40-42. The long, very slender, depressed head was not emphasized by Mayr, except that he made a point of comparing the species with the almost equally narrow-headed *S. clypeata* of North America. The mandibles are rather prominent and broad, with dentition as in the figure. Labral lobes rather stout and incurved, the entire labrum a little longer than broad. Eyes rather large, elongate-oval and rather convex, 7-9 facets in the greatest diameter, slightly protruding at sides when the head is viewed en face. Dorsum of head very feebly impressed in the wide area between the vertex and the posterior clypeal border. Antennal scapes 0.33-0.35 mm. long, bent at about the basal third (ca. 30°), broadest just beyond the bend, where the anterior border is feebly subangulate. Funiculus 0.47-0.49 mm. long; apical segment slightly longer than I-IV taken together.

Pronotum narrow (average width 0.24 mm.); anterior pronotal margin nearly or completely obsolete; pronotal dorsum weakly substriate, appearing weakly submarginate laterally. Mesonotum subcircular seen from above, promesonotal sulcus weakly indicated. Mesonotum and remainder of alitrunk (except shining propodeal declivity) densely and finely punctulate. Propodeal teeth approximately as long as the distance between the centers of their bases, acute, the tips slightly upturned; infradental lamella thin and narrow, but slightly variable in development, narrowing gradually from the tooth downward.

Petiolar node about as long as its peduncle; fine carinulate margins ascending the anterior face to form dorsolateral margins setting off the posterodorsal face as a disc; the disc about 0.11 mm. wide and approximately as long, with rounded anterior border, posteriorly slightly diverging lateral borders, and transverse posterior border. Postpetiolar disc much larger, convex dorsally and smooth and shining, free portion about 0.16 mm. long and 0.26 mm. wide. Spongiform appendages of both segments abundantly developed ventrally, moderately well developed posterolaterally; posterodorsal isthmus of postpetiole discontinuous in the middle, corresponding to a sulcus extending onto the anterior surface of the basal gastric tergite which causes the anterodorsal gastric border to be sinuate and almost completely divides the otherwise very well developed anterodorsal gastric spongiform margin. Basal costulae distinct, bilaterally grouped, spreading fanwise from the spongiform mass on each side of the shallow sulcus, about 9 or 10 in each group and extending about half the length of the first tergite.

In the "typical" form, the erect bristle-like hairs are confined to the mesonotum and the tergites posterior to it, and to a small group of shorter ones on the posterior occiput. Dorsum of head with abundant short spoon-shaped hairs, mostly reclinate; similar but much sparser on the pronotum; clypeus with small, abundant, suborbicular squamiform and appressed hairs, crowded, those on the free border rather uniform, only slightly shorter in the center, touching or overlapping one another; about 12-13 on each side of the midline. "Typical" form without extra-long specialized hairs on sides of occipital lobes or on humeri.

Color ferruginous yellow, varying only very slightly in the series seen.

The anterior clypeal emargination varies slightly in degree in my specimens, appearing nearly straight in workers such as one from Richards Bay. This specimen and another from the same colony also differ from Mayr's description and from the majority of workers from Natal and Southern Rhodesia in having more abundant stiff, erect hairs,

replacing the spoon-shaped ones not only on the propodeal dorsum, but also on the occiput and on the promesonotum. Furthermore, the posterior half of the mesonotum and the propodeal dorsum form a single, very shallow concavity in these specimens. I should consider the Richards Bay specimens as a separate species were it not for the fact, even though my specimens are so few, that other series show apparent intergrades in all these characters. Variability is strongest in the Zululand specimens, and it may be that future specialists working in South Africa will be able to show northern and southern races meeting in the Zululand area not clearly indicated by the present series. The Richards Bay specimens possess weakly differentiated and somewhat elongate humeral hairs.

Female and male unknown. *Type locality*: Port Elizabeth (H. Brauns). *Type* in Mayr Coll.

Material examined: Bird Island, St. Lucia Lake, Zululand, 8 workers (J. C. Faure). Richards Bay, Zululand, 3 workers representing two colonies (J. C. Faure). Sawmills, Southern Rhodesia, 3 workers representing two colonies (G. Arnold, leg. et det.).

SMITHISTRUMA (SMITHISTRUMA) TRANSVERSA (Santschi)

Strumigenys transversa Santschi, 1913, Bull. Soc. Ent. France, pp. 257-258, worker, in key. *Strumigenys* (*Trichoscapa*) *transversa* Santschi, 1914, Medd. Göteborgs Mus. Zool. Afd. 3:31-32, fig. 6, worker. Arnold, 1917, Ann. S. Afr. Mus. 14:380, worker, (subgen. not cited). *Strumigenys* (*Cephaloxys*) *transversa* Emery, 1922, Gen. Ins. Fasc. 174:324. *Smithistruma* (*Smithistruma*) *transversa* Brown, 1948, Trans. Amer. Ent. Soc. 74:105.

Worker: Santschi differentiates this ant (which I have not seen) from *emarginata* on the basis of the straight anterior clypeal border and the "dark yellowish-brown" color. In view of the variability of the clypeal border noted above for *emarginata* and the inadequate description and figure Santschi gives, the characterization of this form and its differentiation from the sympatric *emarginata* must remain in doubt. From Santschi's figure, the head would show a cephalic index of about 70 and a mandibular index of about 23, but this conflicts slightly with his description, "Tete d'un quart plus long que large. . ." The mandibles are approximately $\frac{3}{4}$ the length of the clypeus as shown in the figure, and seem from all the evidence presented by Santschi to be both relatively and absolutely larger and longer than those of *emarginata*. The figure shows a basal diastema of sorts, but I regard this representation as open to question. Only the worker is known; "Long. 2.2 mm." *Type* apparently in Santschi Coll.

Type locality: Pietermaritzburg, Natal (I. Traegaardh).

SMITHISTRUMA (SMITHISTRUMA) TRUNCATIDENS Brown

Pl. I, fig. 12

Smithistruma (*Smithistruma*) *truncatidens* Brown, 1950. Trans. Amer. Ent. Soc. 76:43-45, Pl. 3, fig. 1, worker.

Holotype worker: TL 2.36, HL 0.62, WL 0.64, CI 73, MI 14. Related to *S. emarginata*, but differing considerably in its more robust body build and especially by its broader, more "normal" head. Superficially, it resembles somewhat the Neotropical members of the *schulzi* group in general habitus, especially *S. orchibia* new species. Head with broadly expanded lateral occipital lobes, the latter not continued in outline by the preocular laminae, which are approximately parallel and very feebly convex. Clypeus subpentagonal, with the anterior border broadly and very shallowly emarginate and the anterolateral angles distinct but rounded; lateral clypeal borders weakly convex and moderately convergent anteriorly; clypeal surface approximately plane, with a small, inconspicuous anteromedian tumulus. The anterior clypeal emargination is weaker than in most specimens of *emarginata*, but stronger than in *rostrata*; these three species forming a close series in this respect. Maximum width of the clypeus approximately half the greatest width across the occipital lobes, and the disc slightly broader than long. Dorsum of head between vertex and posterior clypeal border approximately plane, appearing very slightly depressed in profile view; the vertex forming an obtuse rounded angle. ICD about 46. Eyes a little smaller than in *emarginata*, more nearly round, just barely protruding at the sides when head is viewed en face; each with 6-7 facets in the greatest diameter, placed slightly behind the cephalic midlength.

Antennal scape 0.29 mm. long, bent at an angle of about 40° near the basal third;

rather broadly incrassate, not quite so broadly as in *studiosi*, but a bit more so than in *margaritae* among the Neotropical species, broadest just distal to the bend; anterior border straight basally to bend, where it forms a rounded obtuse angle, beyond which it is gently convex until the extreme apex of the scape, which is narrowed and curved slightly anteriorly. Funiculus 0.42 mm. long, the apical segment accounting for more than half the length; basal segment (I) slightly longer than IV; IV about as long as II + III, but much thicker; III appearing (at 60X) slightly broader than long; II about as broad as long.

Mandibles in place and closed resembling those of *S. rosstrata*, but not relatively so long, the toothing rather coarse and occupying the entire visible inner borders. The figure will show the peculiar truncate, blade-like basal lamella so characteristic of this species and for which I have coined the name *truncatidens*.

Pronotum somewhat depressed dorsally; in profile extremely feebly convex and sloping anteriorly; mesonotum gently convex in front, anteriorly and laterally with very feeble margins or carinulae; promesonotal sulcus faintly indicated. Anterior pronotal margin seen from above entire, but not very sharp, passing through gentle humeral curves into the sides and forming with them a major segment of a slightly lengthened circle. Posterior half of mesonotum narrowed and depressed, nearly continuous posteriorly with the propodeal dorsum, the latter very slightly elevated above the level of the posterior mesonotum and feebly convex. Metanotal groove obsolescent, barely discernible as a line. Propodeal teeth acute, with rather broad bases; moderately divergent and about 2/3 as long as their interbasal distance; infradental lamellae low, even, translucent, almost cariniform, following the concavity of the steeply sloping propodeal declivity.

Petiolar node broader than long and shorter than its peduncle; anterior face sloping rather steeply, summit narrowly rounded seen from the side. Cariniform margins of face of node suppressed, not evident. Both posterior collar and ventral strip of spongiform tissue present, but moderately developed. Postpetiole transversely oval, about 1.4 times as broad as the petiolar node and about 1.3 times as broad as long; disc strongly convex, appearing superficially to be smooth and shining, but at higher magnifications seen to be obscurely and very feebly longitudinally striate its length. Postpetiolar spongiform appendages fairly well developed posterolaterally and ventrally, the posterodorsal isthmus very poorly developed and interrupted in the middle. Gaster with weakly depressed dorsum; anterodorsal spongiform margin well developed. First gastric tergite not sulcate anteromedially, but the middle costulae more or less effaced. In spite of this medial gap, the costulae remaining on each side are not "bilaterally grouped" in the sense that they radiate from two common centers; instead, they are parallel, about 20 in number, and extend longitudinally about 1/2 the length of the basal tergite. Remainder of gastric dorsum smooth or nearly smooth and shining, but with a few very feebly roughened areas that may represent foreign material or a secretion. Sculpture of body of the usual *Smithistruma* pattern, except that the pronotum has very obscure longitudinal substriation superimposed on the usual dense, fine punctulation; posterior sides of alitrunk partially smooth and shining.

Head dorsally with rather abundant but inconspicuous, subreclinate to subappressed, short spoon-shaped hairs, a few on the posterior and lateral borders of the occipital region a little longer, more nearly clavate, and obliquely suberect. Hairs on clypeal disc few, extremely small, scale-like, not usually visible at all except in good light at magnifications of 50-60X; hairs on free clypeal border much larger, spoon-shaped and curved toward the middle, about 12 on each side of the midline, forming a fringe much like that of *rostrata*, except that the hairs on the anterolateral corners, while largest, are not so greatly lengthened relative to the lengths of the neighboring hairs on the border; also, the bordering hairs are all much broader than in *rostrata*. The alitrunk has very few and inconspicuous small, narrow reclinate hairs on the dorsum, but these so small that special pains must be taken in order to view them even at higher magnifications. No prominent hairs on the humeri; possibly rubbed off, but not present in paratypes. A pair of conspicuous, erect, feebly clavate hairs on the mesonotum. Petiolar node with a pair of long, stiff, subclavate hairs, directed posteriorly; postpetiole with about 8 moderately long subclavate erect hairs; gaster with about 6 transverse rows of 3-4 feebly clavate, stiffly erect hairs each. Anterior scape border with distinctive hair pattern; the hairs long, linear-spatulate, all curved slightly toward the base except the most basal one (no. 1), which is curved weakly apicad; the hair on the anterior angle at the bend much the longest, distinctly longer than

the greatest width of the scape itself. Pilosity of legs very sparse and inconspicuous, consisting of small, narrow reclinate hairs.

Color dull yellowish-ferrugineous.

Holotype one of a series of 4 workers taken at Lupembe, Tanganyika (K. Bock); deposited in Consani Coll.

Paratypes: The three remaining workers from the type series, taken with the holotype, show only very slight variation. TL 2.35-2.43, HL 0.62, WL 0.63-0.65, CI 72-73, MI 14-15. In the largest specimen, the head is very faintly infuscated posteriorly. [Consani Coll., MCZ]

Signor Consani has also sent a specimen taken by S. Patrizi at Elmenteita, Kenya Colony. TL 2.81, HL 0.69, WL 0.74, CI 73, MI 14. Entire body larger than in the types of *truncatidens*. Substriation of pronotum and postpetiole a little stronger, but still obscure. Gastric costulae extending quite half the length of gastric tergite I, rest of this tergite appearing feebly and superficially but densely shagreened and subopaque. Small suberect spatulate hairs, one on each humerus. Color medium ferrugineous, slightly but distinctly darker than in *truncatidens* types.

Signor Consani believes that this specimen represents a new species, and he may be right. However, the differences are so slight that I do not feel inspired to credit this single specimen as representative of a species distinct from *truncatidens*. In expressing this opinion, I have kept in mind the variability in pilosity of the closely related species, *S. emarginata*, and also the fact that very little is known about variation in other African *Smithistruma*. The material available for *truncatidens* is so scanty, representing only one colony and this single doubtful stray, that I consider it wiser to wait for additional material. If the stray is doubtfully distinct, there is even less justification for calling it a subspecies under modern systematic principles, and no justification whatever for calling it a "variety."

SMITHISTRUMA (SMITHISTRUMA) CAVINASIS Brown

Smithistruma (*Smithistruma*) *cavinasis* Brown, 1950, Trans. Amer. Ent. Soc. 76:42-43, worker.

Holotype worker: TL 2.01, HL 0.55, WL 0.50, CI 63, MI 7 (low MI due both to small size of mandibles and to the partial recession in the deep anterior clypeal excision).

Head shape of *rostrata* group, most like that of *conspersa* Emery, but with very shallowly concave posterior occipital border and clypeus deeply and semicircularly excised anteriorly. Cephalic dorsum convex posteriorly, impressed posterior to clypeus. Clypeus weakly convex, only slightly broader than long, lateral borders convergent and very feebly convex. Eyes moderate in size, placed very slightly behind the cephalic midlength and rather far ventrad; not visible from dorsal view of head. Antennal scape sharply bent at about its basal quarter and thickest at the bend; anterior border at this point forming nearly a right angle; exposed scape length about 0.25 mm. Funiculus about 0.34 mm. long, apical segment $1\frac{1}{2}$ times as long as the remaining funicular segments taken together; segment I much longer than IV; IV as broad or slightly broader than long and slightly longer than II + III, II about as broad as long; III shorter, transverse.

Mandibles very small, closed, their bases received into the clypeal excision (dorsal view) and their depressed blades converging. Dentition uninterrupted along the visible portions of the inner borders, consisting of fine, slender acute teeth, the principal series apparently numbering five, with two smaller ones just basal to the preapical denticulae; the latter and the apical tooth could not be seen distinctly in this specimen due to the complete closure of the mandibles. Since the specimen is a unique, no dissection could be made to determine the structure of the basal lamella. No diastema seen, but it is not known whether one might be present hidden under the clypeal shield.

Alitrunk feebly depressed; pronotum without humeral angles or tubercles and not distinctly marginate laterally. In profile, dorsum of alitrunk forming one continuous weakly convex outline; metanotal groove virtually obsolete. Propodeal teeth short, triangular, acute, subtended ventrally by very slight infradental lamellae gradually diminishing to weak carinulae at ventral extremities. Petiole with node rounded above and about equal to the slender peduncle in length; a fine lamelliform carinula on each side, extending up to the anterior nodal slope to the summit. Postpetiole broad (width about 0.30 mm.) and very convex, approximately twice as broad as the petiolar node. Both nodes with voluminous ventral and lateral spongiform masses. Gaster more strongly convex ventrally

than dorsally, with a heavy anterodorsal transverse border of spongiform tissue. Basal gastric costulae delicate but distinct, well separated and parallel, with feeble reticulation intervening; extending about 1/3 the length of the basal tergite. Remainder of gaster and dorsum of postpetiole smooth and shining.

Alitrunk feebly and indistinctly reticulate-punctulate, appearing somewhat subopaque except for promesonotal dorsum, which is finely and rather irregularly longitudinally striate or rugulose. Head, scapes, legs and petiole densely punctulate and opaque.

Ground pilosity consisting of comparatively few (very few on alitrunk) conspicuous, whitish-yellow, thickened and suborbicularly broadened squamose hairs set close to the integumental surface, but not strictly appressed; more crowded, flatter, and slightly smaller on the clypeal surface; the excision bordered by six of these hairs, three on each side, and the dorsal surfaces of the scapes with a row near the anterior border. Longer spatulate hairs, about 6 on each lateral clypeal border and 8 on the anterior border of each scape, where all but the last three nearest the apex are directed sharply basad. Base of first gastric tergite with a single pair of short, erect, mesially inclined clavate hairs; posterior half of the same tergite with a few scattered short, appressed simple hairs. Apical region of gaster with a few short, fine erect clavate hairs. No specialized erect hairs on head or alitrunk of this specimen.

Color sordid yellowish-ferrugineous.

Holotype a unique collected during February 1948, Beni-Irumu, Ituri Forest, Belgian Congo (N. A. Weber, cat. no. 2129); to be returned to Dr. Weber for eventual deposition in AMNH.

This is a very distinct and bizarre species, differing from the known African species (and from all others known to me) in the extremely small mandibles, shallow posterior occipital excision and very deep anterior clypeal excision. The large, heavy, disc-like hairs are also developed to a degree unique among the species I have seen. The hairs fringing the free clypeal border are so arranged as to heighten the effects of clypeal excision and mandibular recession, and the apices of the hairs form a deep semicircle framing the mandibles on three sides. The longest hairs on the anterolateral lobe-like projections formed by the deep median excision extend forward almost as far as do the mandibles themselves. The clypeal excision is easily the strongest and deepest known for any species of *Smithistruma* known. *Cavinasis* appears to be a very extreme development of the *rostrata* line in the Ethiopian Region, and it is related to the other species of this line here treated as the *emarginata* group. Furthermore, *cavinasis* shows many similarities to the two African species of *Miccostruma*, small forms with the funicular segments reduced to three in number.

KEY TO THE WORKERS OF SMITHISTRUMA S. STR.*

1. Clypeus with a very deep anterior semicircular excision; mandibles very small, partly recessed in the excision (MI 7); clypeal hairs very broadly suborbicular and conspicuous; size small, TL under 2.10 mm. (Congo) *cavinasis* Brown
- Clypeus transverse or shallowly and broadly emarginate anteriorly; mandibles larger, projecting (MI well over 10); clypeal hairs not broadly suborbicular; size larger, TL over 2.10 mm. 2
2. Head very long and narrow (CI under 65), depressed; mandibular dentition as in figure 11 (eastern South Africa) *emarginata* (Mayr)
- Head broader (CI over 65) 3
3. Anterior clypeal border gently emarginate; prominent erect hairs on alitrunk at most two pairs; MI under 20; mandibular dentition as in fig. 12 (British East Africa) *truncatidens* Brown
- Anterior clypeal border straight (teste Santschi); numerous prominent erect hairs on alitrunk; MI over 20; mandibular dentition in doubt, see discussion in text (eastern South Africa) *transversa* (Santschi)

SMITHISTRUMA OF THE PALEARCTIC REGION

The Palearctic Region contains two distinct faunas. The Sino-Japanese fauna contains two known species belonging to the *rostrata* group; these have

* This key applies to species of the Ethiopian Region.

been described in Part I of the present revision (Mushi, XX, pp. 10-14. 1949). These two species are *incerta* and *rostrataeformis*. The older species *japonica* is presently removed from *Smithistruma* to *Weberistruma*, so that all doubts as to the validity of *incerta* are considered dissipated.

BAUDUERI GROUP

The Mediterranean fauna contains *baudueri* and two forms which seem to differ from the typical *baudueri* in the form of the cephalic pilosity. There is no doubt as to what the typical *baudueri* is; Emery has described it well enough and figured it rather completely in his work of 1916 (loc. cit. infra); only a few additional points of interest are offered below. The trouble comes with two variants having narrowed cephalic pilosity, one in which the hairs are elongate and rather slender, but still with distinctly spatulate apices (on the clypeus), and the other with even finer pilosity, that of the clypeus with no apical flattening, or at least no flattening discernible at a magnification of about 85X.

One of these forms undoubtedly corresponds to Emery's variety *tenuipilis*, but I cannot say with certainty which should bear this name because of Emery's ambiguous original statement. The chances appear great that the form with some slight broadening of the clypeal hairs is *tenuipilis*, because I have such specimens from northern Italy, and the original localities are Monte Argentaro (here restricted as type locality) and "southern France," whereas the form with extremely fine pilosity is from Corfu. These pilosity forms correspond in a rough way to the series *clypeata-pilinasis-laevinasis* of North America, and Emery's statement regarding *tenuipilis*, "The var. *pilinasis* For. of *S. clypeata* Rog. differs from the type species by the same character," is perhaps to be regarded as additional evidence that *tenuipilis* is represented by the "intermediate" form.

The problem of designating these forms as species, subspecies or mere non-taxonomic variants is a trying one, and the solution presented here is to be regarded as completely tentative, open best to investigation by European workers on the spot. Since the variation appears to be constant in the known material, and since the evidence for the broad allopatry of the three forms is not at all convincing, I believe that these forms must be considered as specifically distinct in a provisional sense. The form from Corfu is named as a new species, *tenuissima*, with the hope that Mediterranean specialists will test it thoroughly on the basis of modern population systematics. Should clear intergrades be found to link the three *baudueri* group forms, synonymy of both *tenuipilis* and *tenuissima* would be indicated, and furthermore, light would be shed on the possible relationships within the *clypeata* group. It must be emphasized that these three forms differ in no discernible character of marked significance except that of pilosity.

SMITHISTRUMA (SMITHISTRUMA) BAUDUERI (Emery)

Pl. II, fig. 25

Epitritus baudueri Emery, 1875, Ann. Mus. Civ. Stor. Nat., Genova 7:474, fig., female. *Strumigenys baudueri* Emery, 1887, Ann. Mus. Civ. Stor. Nat., Genova 25:468, footnote. *Strumigenys normandi* Santschi, 1910, Bull. Soc. Hist. Nat. Afr. Nord 1:71, fig., worker. (Reference not seen) *Strumigenys (Trichoscapa) baudueri* var. *normandi*

Santschi, 1913, Bull. Soc. Ent. France, p. 258, worker, in key. *Strumigenys* (*Cephaloxys*) *baudueri* Emery, 1916, Bull. Soc. Ent. Ital. 47:204-206, figs. 61, 62, worker, female, male. 1922, Gen. Ins. Fasc. 174:323 (see for further early references). Bondroit, 1918, Ann. Soc. Ent. France 87:168, fig. 82, all castes. *Strumigenys bauderi* [sic] Menozzi, 1928, Boll. Lab. Zool. Ist. Agr. Portici 21:128, male, biology. *Strumigenys baudieri* [sic] Stiller, 1937, Ent. Nachrichtenblatt 11:175, biology. (Other European authors have used this name spelled as Stiller has it. These references, which are records mostly from the Adriatic littoral, are not cited here because they add little to the general knowledge of this ant.)

Worker: 24 specimens, representing about 10 colonies, from Hungary, Dalmatia, vicinity of Trieste, Italy, etc. TL 1.86-2.09, HL 0.54-0.58, CI 67-72, MI 15-18. Emery has described and figured this ant rather well in his work of 1916 (loc. cit.), and special attention is drawn to his figure 61b, which shows the typical clypeal pilosity. The hairs on the cephalic dorsum posterior to the clypeus are short and more or less spoon-shaped, becoming longer and narrower on the occiput. Propodeal dorsum and declivity most often shining, as are the dorsal surfaces of both nodes and the greater part of the pronotal dorsum. Head cuneiform, the sides and preocular laminae converging and forming straight, continuous outlines to the mandibular apices. The surface of the clypeus varying from subopaque to opaque.

Female: Based on a single female from Florence (Andreini), TL 2.28, HL 0.60, CI 70, MI 13. Emery gives the total length of the female as 2.3 mm., which checks very well with my measurements; however, his measurements of the worker ("2.23 mm.") average greater than mine. I very much doubt that the worker ever gets as large as the female.

Male: I have seen no male specimens. Emery's description of a male (1916) assigned with doubt to this species has been verified by Menozzi, who found males associated with workers and compared them with Emery's allotype; he declared his specimens identical to that of Emery.

Type locality: Sos, southern France (Bauduer). Type in Emery Coll.

MATERIAL EXAMINED

HUNGARY: Szeged (V. Stiller).

ITALY, DALMATIA, ETC.: Trieste (Springer); Liserta (Tasso, Schatzmeyer and Koch); Sucurac (Novak); Zemonico (G. Müller, B. Finzi); Lucca (A. Andreini); Florence (A. Andreini); Genoa (Solari); S. Viot, Modena (Emilia); Genoa (Mantero). A few other specimens from northern and central Italian localities were too badly depilated to afford certain determinations. Emery cites as localities Pantelleria, Corsica, Sardinia, Tunisia, South of France and Constantinople; *baudueri* is apparently widespread in the Mediterranean region, but I consider it at least possible that some of these records may refer to one or both of the other forms discussed here. Emery synonymized Santschi's species *normandi* from North Africa; Santschi himself had earlier lowered this form to the status of a variety. I have not seen the *normandi* types, but the future European reviser of this group should test the synonymy thoroughly.

SMITHISTRUMA (SMITHISTRUMA) TENUIPILIS (Emery)

Strumigenys baudueri var. *tenuipilis* Emery, 1915, Ann. Mus. Civ. Stor. Nat., Genova 46:264, worker. *Strumigenys* (*Cephaloxys*) *baudueri* var. *tenuipilis* Emery, 1916, Bull. Soc. Ent. Ital. 47:205, worker. Bondroit, 1918, Ann. Soc. Ent. France 87:168. Emery, 1922, Gen. Ins. Fasc. 174:323.

Worker: I refer to this species three specimens from Cadenabbia, Como, Lombardia (G. Binaghi) in the Finzi Collection. The clypeal hairs are decidedly more slender and elongate than those of *baudueri*, distinctly raised in an arch away from the surface of the clypeal disc and curving anteriorly and mesially. The apices of the hairs are seen to be narrowly spatulate at magnifications of 60X and more. The hairs of the remainder of the cephalic dorsum are longer and more filiform than those of *baudueri*. Emery's original description is as follows in translation:

"... differing from all the other examples of *baudueri* I have seen in that the clypeal hairs are not squamously dilated, and for this reason do not appear as white points." I have already noted his comparison to *S. pilinasis* in the discussion above. The size, proportions and other characteristics as in *baudueri*.

Type locality: Monte Argentaro (by present restriction). Other original locality was stated merely as "southern France." Types in Emery Coll.

Smithistruma (Smithistruma) tenuissima new species

Holotype worker: Size and proportions as in *S. baudueri* and *S. tenuipilis*. Clypeal pilosity abundant but very fine and filiform, the apices appearing truncate, or in some cases even slightly tapered, at a magnification of 85X; the hairs arched curved weakly mesially. The thickness of the individual hairs appears similar to that shown in the figure of *S. flitalpa* (Pl. 1, fig. 8). The anterior half of the clypeal disc weakly shining, posterior half subopaque. Hairs on upper (posterior) cephalic dorsum very fine and filiform, more so than in the Lombardian specimens referred to *tenuipilis*. Mesonotum with slightly irregular, spaced longitudinal rugulae, these stronger than in any other specimens of the *baudueri* group I have seen to date, but since the rugulae are more or less weakly developed in all *baudueri* specimens, this feature may perhaps be discounted. Otherwise as in *baudueri* and *tenuipilis* in all discernible details.

Holotype a unique taken at Gasturi, Corfu (Beier), in Finzi Coll. deposited in MCZ.

Prof. Finzi had this specimen set off separately in his collection, but under the specimens bearing the general label "*baudueri*." I describe the form as a species (with some misgivings) in the hope that its recognition as a separate form will stimulate collection of and research upon the *Smithistruma* of southern Europe. I stand ready to compare specimens or give any needed information concerning the type, which I fully realize may ultimately have to be considered as a synonym, together with *tenuipilis*, of a very variable *baudueri*.

REFERENCES

- BROWN, W. L., JR. 1948—A preliminary generic revision of the higher Dacetini. Trans. Amer. Ent. Soc. 74:101-129, 2 figs., key.
- 1949a—Revision of the ant tribe Dacetini. III. *Epitritus* Emery and *Quadristruma* new genus. Ibid. 75:43-51, fig. 1.
- 1949b—Revision of the ant tribe Dacetini. I. Fauna of Japan, China and Taiwan. Mushi 20:1-25, 2 figs., key.
- 1949c—Revision of the ant tribe Dacetini. IV. Some genera properly excluded from the Dacetini, with the establishment of the Basicerotini new tribe. Trans. Amer. Ent. Soc. 75:83-96.
- BUGNION, E. 1930—Les Pieces buccales, le Sac infrabuccal et le Pharynx des Fourmis. Bull. Soc. R. Ent. Egypte (n.s.) 14:85-210, 68 figs.
- DARLINGTON, P. J., JR. 1948—The geographic distribution of the cold-blooded vertebrates. Quart. Rev. Biol. 23:1-26, 105-123, 5 figs., 8 tables.
- EMERY, C. 1875—Le formiche ipogee, con descrizioni di specie nuove o poco note. Ann. Mus. Civ. Stor. Nat. Genova 7:11-12, figs.
- 1890—Studi sulle formiche Neotropica III. Nuove forme Americane dei generi *Strumigenys* e *Epitritus*. Bull. Soc. Ent. Ital. 23:67-70, Pls. 7 and 8.
- 1894—Studi sulle formiche della fauna Neotropica VI. Ibid. 26:213-215, Pl. 1, figs. 5-9.
- 1895—Beiträge zur Kenntniss der Nordamerikanische Ameisenfauna. Zool. Jahrb. Syst. 8:326-329, Pl. 8, figs. 17-24.
- 1905—Studi sulle formiche della fauna Neotropica XXVI. Bull. Soc. Ent. Ital. 37:167-170, figs. 26-29.
- 1916—Fauna Entomologica Italiana. Formicidae. Ibid. 47:203-207, figs. 61-64.
- 1922—Genera Insectorum, Fasc. 174:312-330. Pls. 6 and 7.
- KENNEDY, C. H. AND M. M. SCHRAMM 1933—A new *Strumigenys* with notes on Ohio species. Ann. Ent. Soc. Amer. 26:95-104, 14 figs.
- MANN, W. M. 1916—The Ants of Brazil. Bull. Mus. Comp. Zool. Harvard 60:452-453, Pl. 5.
- SMITH, M. R. 1931—A revision of the genus *Strumigenys* of America, north of Mexico, based on a study of the workers. Ann. Ent. Soc. Amer. 24:686-706, Pls. 1-4, key.
- 1943—A generic and subgeneric synopsis of the male ants of the United States. Amer. Midl. Nat. 30:306-307.
- 1947—A generic and subgeneric synopsis of the United States ants, based on the workers. Ibid. 37:585-587, Pl. 14, figs. 53, 54.

- WEBER, N. A. 1946—Dimorphism in the African *Oecophylla* worker and an anomaly. Ann. Ent. Soc. Amer. 39:7-10, Pl. 1.
- WESSON, L. G. 1936—Contribution toward the biology of *Strumigenys pergandei*: A new food relationship among ants. Ent. News 47:171-174.
- AND R. G. WESSON 1939—Notes on *Strumigenys* from southern Ohio, with descriptions of six new species. Psyche 46:91-112, Pl. 3, key.
- WHEELER, W. M. 1927—The physiognomy of insects. Quart. Rev. Biol. 2:14-32, figs. 13, 15, 17, 40.

PLATES

All plate figures, with exception of figures 6, 8 and 9, were drawn with the aid of a camera lucida from specimens mounted in damar, using the high dry objective of a standard microscope and 10X oculars. Figures 6, 8 and 9 were drawn with the aid of a squared ocular disc and a stereoscopic microscope. The inking of Plates I and II was accomplished by Mr. F. Y. Cheng, who also did figures 34-38 on Plate III. Others on Plate III were inked by Mr. W. L. Nutting or myself. All original pencil drawings are by the author. Most of the figures are at best only very roughly to scale.

PLATE I

Figs. 1-14. *Smithistruma* workers unless stated otherwise.—1. *S. creightoni* (M. R. Smith), left mandible, ventral view. Nidotypic specimen. 2. *S. ornata* (Mayr), left mandible, ventral view, showing adventitious tooth as dashed line. Composite drawing. 3. *S. abdita* (L. and R. Wesson), left mandible, ventral view. Gibraltar Island, Ohio. 4. *S. ohioensis* (Kennedy and Schramm), left mandible of male, ventral view. Knoxville, Tennessee. 5. *S. talpa* (Weber), left mandible of male, dorsal view. Knoxville, Tennessee. 6. *S. bunki* Brown, clypeal outline. Paratype, Slidell, Louisiana. 7. *S. missouriensis* (M. R. Smith), right mandible, ventral view. South-central Ohio. 8. *S. flitalpa* Brown, clypeal outline. Holotype. 9. *S. wrayi* Brown, clypeal outline. Holotype. 10. *S. bunki* Brown, right mandible, ventral view. Paratype, Landon, Mississippi. 11. *S. emarginata* (Mayr), right mandible, dorsal view. St. Lucia Lake, Zululand. 12. *S. truncatidens* Brown, left mandible, dorsal view. Paratype, Lupembe, Tanganyika. 13. *S. dubia* n. sp., left mandible, ventral view. Paratype, Garakayo I., Palau Group. 14. *S. pedunculata* n. sp., right mandible, ventral view. Paratype, Negros Or., Philippines.

PLATE II

Figs. 15-26. *Smithistruma*, Mandibles of workers.—15. *S. nigrescens* (Wheeler), left, ventral view. Mina Carlota, Cuba. 16. *S. clypeata* (Roger), left, ventral view, showing adventitious tooth as dashed line. Composite. 17. *S. alberti* (Forel), right, dorsal view. Laudet, Dominica, B. W. I. 18. *S. (Platystruma) depressiceps* (Weber), left, ventral view. Cotype, Kartabo, British Guiana. 19. *S. ohioensis* (Kennedy and Schramm), left, dorsal view. South-central Ohio. 20. *S. margaritae* (Forel), right, ventral view. New Braunfels, Texas. 21. *S. friderici-mülleri*, left, dorsal view. Cotype, Itajaí, Brazil. 22. *S. alegrensis* n. sp., left, mesial view. Paratype, Porto Alegre, Brazil. 23. *S. epinotalis* (Weber), right, ventral view. Cotype of *S. skwarrae* (syn.), Mirador, Vera Cruz. 24. *S. orchibia* n. sp., left, dorsal view. Paratype, Venezuela. 25. *S. baudueri* (Emery), left, ventral view. Genoa, Italy. 26. *S. rostrata* (Emery), left, ventral view. Newport News, Virginia.

PLATE III

Figs. 27-38. *Smithistruma*.—27-33. Volsellae of males: 27. *S. alberti* (Forel). Laudet, Dominica, B. W. I. 28. *S. rostrata* (Emery). South-central Ohio. 29. *S. (Wessoni-struma) pergandei* (Emery). South-central Ohio. 30. *S. ohioensis* (Kennedy and Schramm). Knoxville, Tennessee. 31. *S. talpa* (Weber). Knoxville, Tennessee. 33. *S. lamellignatha* n. sp. Alloparatype, Mt. Tibang, N. Borneo. 32-38. Mandibles of various genera: 32. *Smithistruma rostrata* (Emery), male, left, dorsal view. South-central Ohio. 34. *Tingimyrax mirabilis* Mann, worker, right, dorsal view. Cotype. 35. *Strumigenys* (Pyramica) *gundlachi* Roger, mesial view, tip of mandible shown in fig. 38. 36. *Neostruma* sp., mesial view, tip of mandible shown in fig. 37. 37. *Neostruma* sp., worker, left, dorsal view. Barro Colorado I., Canal Zone. 38. *Str. (P.) gundlachi*, worker, left, dorsal view. Soledad, Limones Seboruco, Cuba.

PLATE I

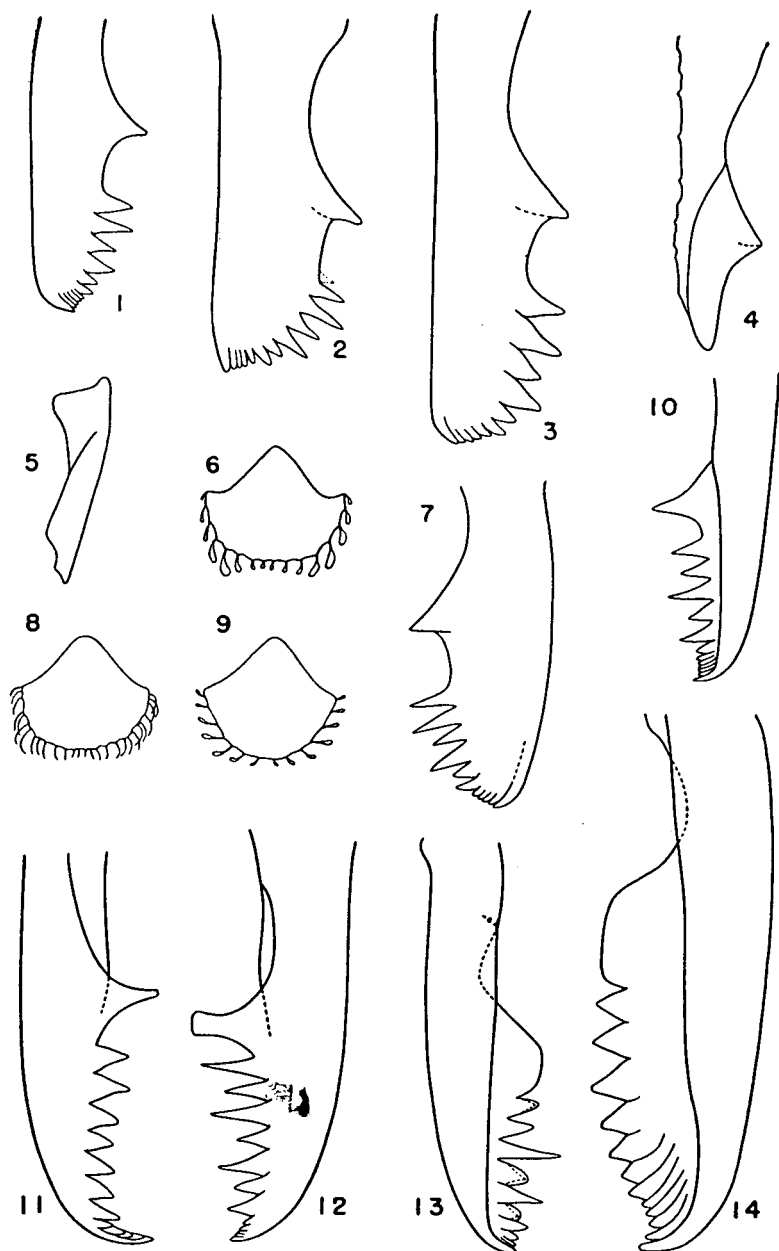


PLATE II

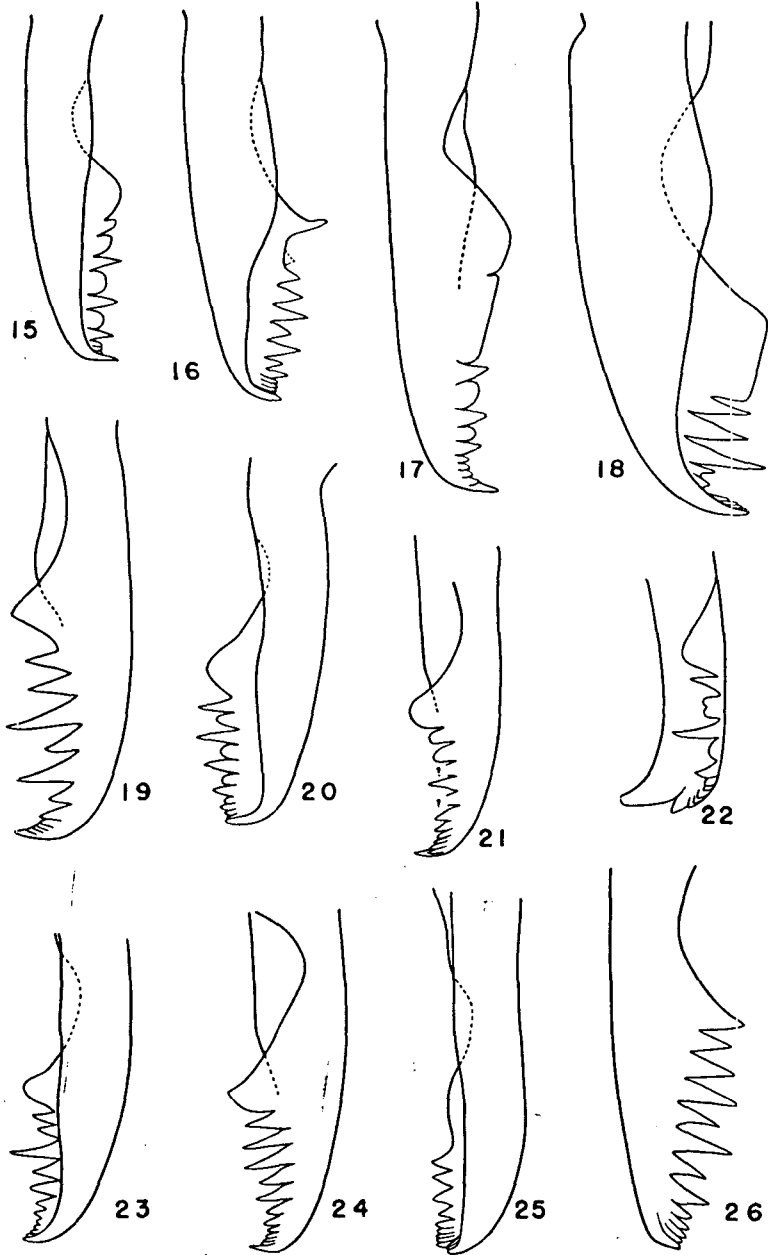


PLATE III

