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ZOOLOGICAL NOMENCLATURE

ANNOUNCEMENT A (N.S.) 96

Required six months' notice is given of the possible use of plenary powers by the International Commission on Zoological Nomenclature in connection with the following names listed by case number. (See *Bull. zool. Nom.* 32, part 2, 27th June 1975.)

2044. Suppression of *Acarus pseudogallarum* Vallot, 1836 and *Phytoptus coryligallarum* Targioni Tozzetti, 1885 (Acarina, Eriophyoidea).

1944. *Lyda alternans* Costa, 1859 (Insecta, Hymenoptera) proposed precedence over *Lyda inanis* Klug, 1808.

2068. *Phloiotribus* Latreille, 1796 (Insecta, Coleoptera) proposed suppression.

Comments should be sent in duplicate, citing case number, to the Secretary, International Commission on Zoological Nomenclature, c/o British Museum (Natural History), Cromwell Road, London, SW7 5BD, England. Those received early enough will be published in the *Bulletin of Zoological Nomenclature*.—MARGARET GREEN, *Scientific Assistant.*

Natural History of *Veromessor pergandei*. II. Behavior[1]

(Hymenoptera: Formicidae)

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Foraging. By far the most impressive above-ground activity of *V. pergandei* is its foraging in long narrow straight colums. Out-going and returning foragers use the same route; collisions are, therefore, frequent. Fig. 1 maps the relative positions of some of the intensively studied nests and directions and distances travelled by columns from Nest 1, 5, 8 and 10. Some entrances had columns leading in different directions at the same time. One column was 40 m long and involved about 17,000 ants. Fig. 2 maps foraging columns from the 4 craters at Nest 1 for 3 random days; note the bent column on 14 June from Entrances G, H and I. The numbers at the ends of the columns are estimates of the number of foragers in that colümn at a given time.

In the evening, the first indication that a column was about to form was the covering of the inside of the crater by hundreds of ants. When the temperature was high, these foragers stayed in the shaded area in the crater. However, once the crater was filled, and without any evident signal, a narrow column of ants would begin to leave the crater in one direction followed by thousands more. This process was observed frequently in the late afternoon and evening from the time when no ants were on the surface until the full column was out. There was never any advance indication which direction a column would take; no scouts or leaders were ever seen; first 2 or 3 ants would seem to lead, and then others would take their places.

In the morning, when workers were slowed by cooler temperatures, an initial cluster of several thousand led the column. Only after this cluster had reached the foraging area was the column reduced to normal width. On the morning of 19 June, one such initial cluster from Nest 8 travelled 15 m per min.

The usual column was a straight narrow band; there were, however, also a few branched and a few curved columns. On the afternoon of 13 June, there was a cloud cover and on the morning of 14 June a trace

[1] The first portion of this study concerned nest architecture and construction (Pan-Pac. Entomol. 51: 205–216).

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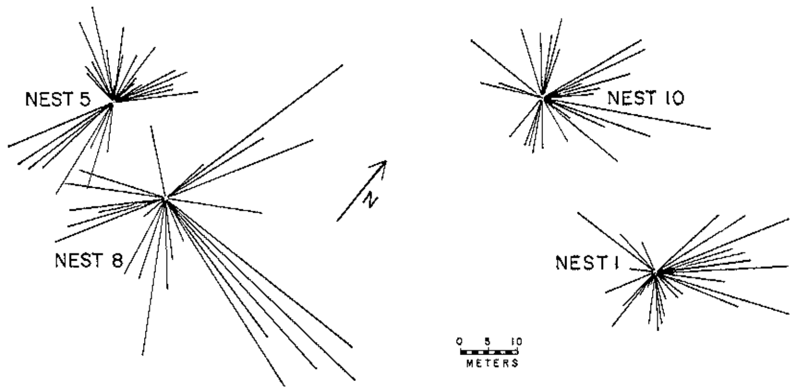

FIG. 1. Map of Nests 1, 5, 8 and 10. The radiating lines give the directions and lengths of all observed foraging columns.

of rain; the air temperature remained about 18 C throught the morning. An early morning check of Nests 1, 3, 5, 8 and 10 showed a single column at each nest; by 0930 Pacific Standard Time, Nest 1 had a branched column with approximately 8,000 workers foraging (the largest number observed at this nest); by 1030, Nests 5 and 10 had 2 columns each, while Nest 3 had 3 columns. The morning of 15 June was cool (16° C) but there was no cloud cover, the temperature rose rapidly, and each nest produced only one column.

On the evening of 9 June, 75 ants left Entrance A at Nest 8 and went 60 cm almost single-file toward the northwest. These, however, were not followed by other ants, and within 3 min there were only about 25 ants in the area. Several minutes later, a normal column started eastward; 20 min later, it was 10½ m long and included about 1500 ants. On 25 May, at Nest 8 one column started southeastward and one southwestward. Two minutes later the southeastern column had 20 foragers, while the southwestern column became 20 m long with about 5,000 ants.

Most ants went to the end of the route and spread over a wide area. Some foragers hunted along the route curving away from the column to about 50 cm on each side. They frequently climbed plants along the route, such as, *Oenothera clavaeformis* and *Mentzelia albicaulis* between Craters 3 and 4 of Nest 1. They examined all portions of the plant, but especially the seed capsules (Went *et al.* 1972, Fig. 2) even when empty. As many as 250 ants were found on one small clump of plants.

Percentages of fruits of each species taken from the foragers as well as other items brought to the nest were tallied for each nest for the entire study period. Samples of refuse piles from several nests were brought

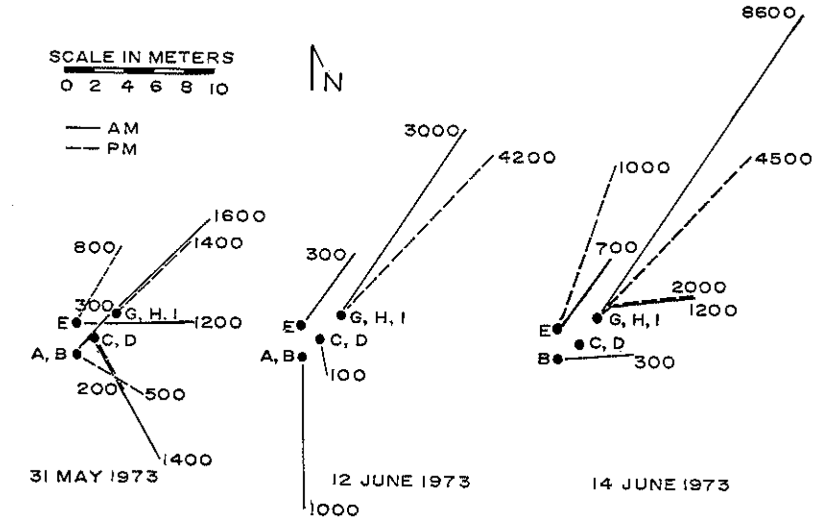

FIG. 2. Foraging columns for Nest 1 on 3 random days. On 14 June Entrance A was abandoned; C and D were inactive; G, H and I sent out double columns both morning and afternoon, the shorter had an angle of 45° about 1 m from the entrance. Numbers at the terminus of trail are estimates of foragers on trail at one time.

back to Reno. Each sample was hand-shaken through soil-sample sieves, the seeds separated by flotation from the sand and gravel, and each size-class was examined for seeds and seed coats. To test the fidelity (see under Discussion, below) of *V. pergandei*, workers were color-coded by placing one or two spots of nail polish of different colors on the dorsal surface of the gaster with a fine brush. The ant was first immobilized by chilling, coded, and finally released in its home nest.

The percentages of different kinds of fruits harvested varied greatly depending on the direction of the column. For example, when the column from Nest 5 changed from 170° to 210° (clockwise from N), the proportion of fruits from *Chenopodium pumilio* changed from 42% to 86%; when the column went in any other directions, the fruits of this species accounted for no more than 5%. The same colony harvested seeds of *Oe. clavaeformis* only when the column foraged between 30° and 40°. *Oe. clavaeformis* was collected by Nest 1 in all directions; many plants of this species grew nearby. They were taken less frequently at Nest 8, where this plant was less common. At Nest 1, however, ants from Entrances G, H and I had to pass over a 6-cm high wall of *Franseria dumosa* burs, an item that was not collected in great quantity at any nest at this time. Composite flower parts were brought into the nest even when fruits were plentiful.

On the morning of 3 June, one coded ant made 3 trips in the 15-meter column from Entrances G, H and I of Nest 1. On each trip she did her main foraging at a clump of *Oe. clavaeformis* 3½ m from the entrance and 75 cm from the main column. She left the entrance and soon began to angle toward the plants (as opposed to leaving the column adjacent to them). She searched a little on the outward trip, but when she reached the clump, hunted under large pebbles, moved smaller ones, stopped to clean herself and climbed briefly in the plants; then she found *Oenothera* seeds and carried some back to the nest. The return trip (at 2.8 m per min) was faster than the out-bound trip, although it was interrupted by brief searches. She stayed in the nest 20 sec one time and 30 sec another. This particular ant returned to the same foraging area, did not go to the end of the column before foraging, and usually used Entrance H. The times required for 3 foraging trips were 10, 12 and 17 min. This was a common pattern for foragers.

In an attempt to determine whether each forager normally carried something, foragers were aspirated at several craters and deprived of their loads. At times, fewer fruits than ants were collected. This was especially true in the morning when the temperature was rising rapidly (Nest 1, 30-V, 0825) and the ants were hurrying back to the nest. An average of 79% of all aspirated ants carried something. The amount of non-fruit plant-material (leaves, stems, flowers) brought to the nest during the observation period for all nests averaged 12% of the total. Some of the easily identifiable pieces were not found in the refuse heap.

It is interesting to speculate whether any use is made of the non-fruit plant parts brought into the nest by foragers. Dr. Johanna C. Went of Arnhem, Netherlands, studied the soil flora (bacteria, actinomycetes, fungi and yeasts) in January and March, 1972, in our death Valley area. She took samples from the open soil, from under growing *Franseria*, *Hymenoclea* and *Larrea* plants and from several places in *V. pergandei* nests. In March she took samples from the seeds in the seed chambers, from chamber soil and from soil between chambers. She found her highest counts of bacteria, actinomycetes and fungi on seeds from the seed chambers, but her only yeast cultures in all the samples were in the refuse piles of the ant nests.

Trail-marking. To determine whether *V. pergandei* used a trail-marking pheromone, a mirror was embedded in an area frequently crossed by a column from Nest 1, Entrance E. As the column crossed the glass surface, there was no evidence of trail-marking action nor a smear of any liquid. Frequently, the columns would widen and become less organized as they crossed a steep gravel embankment 1½ m high near Nests 1 and 8; then they would narrow again after crossing the obstruction. However, very large columns from Nest 3, Entrance A travelled 32 m across very rugged terrain and remained compact. Ants from Nests 1 and 8 should have no difficulty climbing the face of the embankment; the ants at Nest 3 easily managed much more rugged terrain. Such widening of the column would not be expected if the ants were following a chemical marker since the change in topography should have little effect. Such disturbance in the column, however, could result if individual ants were using geographical landmarks as navigating aids.

Several marked ants were released a few meters from their home nests, but not in a column. Many never found their nest; several, however, did head directly for the nest after a brief period of wandering. Marked ants, released in the column, usually found their way to the nest after a brief period; they went first to the nest and then went out in the foraging column.

The area around one crater was flooded so that ants returning in the column were blocked from the entrance. A short piece of marker-stake (about 2½ cm wide) was supplied as a bridge; gradually some ants started using it. When an ant carrying a seed was halfway across it, the bridge was rotated 180°. The ant proceeded ahead, now in the wrong direction, returned to the bank, turned 90°, proceeded 50 cm and then returned to the bridge. Again the bridge was rotated, but this time the ant corrected her course and proceeded to the nest.

If the soil surface over which a trail had been established was disturbed, ants would "pile up" on either side of the disturbed area. After several minutes (depending on the width of the disturbance) several crossed; and finally the column was reconstructed.

Orientation. In Death Valley in May and June 1973, a one-m shadow was cast across a column from Nest 5, as it crossed the paved road; no disturbance in the column was detected. There was still no change when the shaded area was illuminated from the east, north or south with a medium-sized mirror. Nest 2, which was located on the edge of a gravel road, had columns on 3 occasions which were completely shaded by a 60-cm high gravel embankment. These columns occurred on 12, 19 and 20 June and were 16½, 1¼ and 15 m long. At 0305 (about 2 hours before sunrise) on 21 June, a column at Nest 8 was already 5 m long; the workers were all outward bound. On 8 July 1973, a column at Nest 2 was well established (workers moving in both directions) and 12 m long at 0320—again before sunrise. At this hour there was no light visible to the human observer in the eastern sky.

In Death Valley at 0530 on 1 September 1968, ants were active on the mound and a foraging trail had been formed. At 0830 the sun had been on the crater for some time, but the ants were still foraging. On 4 September at 0530, ants were actively foraging at 2 craters; one of the trails was about 48 m long; at 0845 foraging stopped abruptly. At 0830 on 5 September, in direct sunlight the temperature was high, but there was a strong breeze; ants were foraging at 3 different craters.

In Deep Canyon on 1 May on a warm evening, we collected workers which were actively harvesting when it was so dark that flashlights were needed to find the ants. The workers seemed as numerous in the column and moved in the same manner (both in speed and in integrity of the column) as in daylight. They also seemed to be bringing in the same amount of seeds.

In Deep Canyon in winter, we placed a metal-walled trap around an actively foraging crater. The ants leaving the nest went as far as the shadow (about 20 to 30 cm long) cast by the trap-wall, milled around and returned to the entrance. The next morning, numerous entrances had been opened outside the trap and in the sunshine; ants were busy harvesting, going in the same direction that they had used before the trap was in place (Went *et al.* 1972: 82–83).

Nest-workers. In May and June, the activity of nest-workers, (the ants which removed the excavated material and organic refuse from the nest) seemed directly related to temperature. They were normally active throughout the night until 0800 or 0900 and reappeared between 1630 and 1700. On hotter days, they went underground earlier and stayed longer. On cool, cloudy days, nest-workers moved rapidly all day, but their greatest activity was at night. We observed 20 to 30 ants working while an evening column moved out; this number increased steadily until 250–300 were involved between 2300 and 0100 at Nests 5, 8 and 10. The initial evening activity was the appearance of about 10 minim nest-workers. They ran a short distance from the entrance, dropped their loads and darted back into the nest. Within 10 minutes, larger nest-workers appeared.

On the morning of 25 May, about 200 ants, most of which were nest-workers, were on the crater of Nest 5. A major worker was crushed and dropped back into the crater; immediately most of the ants rushed into the entrance. For the next 8 minutes ants approached the crushed major, palpated her with their antennae and hurried away. Finally, a minim began to pull the crushed worker away from the entrance while other ants were still palpating her; the minim left the dead ant half way down the outside of the crater. It was soon picked up by a major, which carried it 6½ m from the nest, dropped it, and then started to forage.

Guards. During the day, workers stood near the entrance, clinging to the ceiling of the vestibule, with their heads pointed toward the center of the opening, with their mandibles open and their antennae waving. At night, about 200 stood on the surface of the crater near the entrance. When disturbed, they ran frantically in and out of the entrance, alarming other workers and attacking the source of the disturbance. Sometimes guards (and nest-workers) reacted similarly when the observer leaned over the nest (during the day) or illuminated the entrance with a bright flashlight (at night); but at other times the same stimuli failed to cause any reaction. Frequently 30 or 40 ants ran frantically about and up the boots of the observer at 14 cm from the entrance at Nest 8, even though there had been no ants in the area when he approached. This often happened during the day when no guards were seen. However (see below) workers changed roles frequently and it is probable that nest-workers or foragers served also as guards. At night, it was the guards which attacked.

Role-changing and Internidal Hostility. The marking technique was used to see whether workers were usually limited to one role. At Nest 8, 35 nest-workers were marked pink and 67 guards white. The marked nest-workers foraged while marked guards did both nest-work and foraging. A nest-worker from Entrance A of Nest 8 was seen carrying sand from the newly formed Entrance B. Ninety-two foragers at Entrances G, H and I of Nest 1 were marked pink. They were frequently found later in this crater's column, but some were found in E's column, while others did nest-work and guarded at Entrances C and D, and did nest-work at B. None of the marked ants was ever found in any other nest.

Fighting occurred frequently around Nest 2 and Nest 10. At Nest 2 in May 1973, fighting was in progress, with black piles of dead ants in the vicinity. Thereafter Nest 2 became inactive temporarily; then normal foraging was resumed. On 20 and 21 January 1974, Nest 2 was active; Nest 10 was inactive or had been abandoned.

DISCUSSION

Behavior. Creighton (1953) studied this ant at 57 stations over most of its range from early March until November. He concluded that this species is adapted to the hottest and most arid desert areas of the southwestern United States by: (1) foraging only when the soil surface was below a certain critical temperature [Equipment for measuring actual soil surface temperatures was not available then.]; (2) foraging when the light intensity was less than the maximum; and (3) foraging only after all the fruits collected in the last foraging column had been husked (p. 15).

Tevis (1958) worked on *V. pergandei* in the Coachella Valley near Palm Desert. He agreed with Creighton about the lethal effects of summer midday temperatures, but noted that ants in the Valley started work before dawn and formed foraging colums which worked after dark on especially warm summer nights. (Creighton had reported that *V. pergandei* needed direct sunlight for orientation.)

We found that this species in the alluvium of the canyon floors both in Death Valley and Deep Canyon started foraging before dawn—while there was no light visible in the sky to the human observer—and continued working after dark. The integrity of the columns did not seem to change, nor did the amount of seed brought to the nest diminish without direct sunlight. These observations were made during May, June and September. In December, January and February on cool days, there was only one midday period of activity when the temperature rose high enough to allow activity. Therefore, our only disagreement with Creighton and Tevis is that night foraging seems to be very common during the hottest months if fruits from winter annuals are abundant.

Our test of the fidelity of the foraging ants to the same trail showed not only that *V. pergandei* foragers did not always use the some trail, but that workers shifted from one task to another. This is in marked contrast to European "individual wood-ants [which] are to some extent faithful to particular routes or even particular trees at the end of the routes" (Sudd 1967: 82). Sudd noted, however, that *F. aquilonia* showed much less fidelity to one route. *V. pergandei* showed flexibility in another way: a worker deprived of a bur of *Franseria dumosa* picked up a utricle of *Atriplex hymenelytra* out of the petri dish in which she was detained. Thus, this ant was not "programmed" for one species of fruits at this time. In fact, these harvesters seemed to be "opportunists" in regards to annuals and collected any fruits which were available in approximately the number in which they were present. *Franseria* was largely ignored at this time. But no one has mentioned any ants which shifted tasks as quickly as the *V. pergandei* worker which carried a dead nest-mate away from the crater and then continued the trip to forage for food. (See Wilson 1971: 163.)

Tevis reported that these harvesters brought about 7% leaves, stems, petals and dead seedlings to the nest; he said that this material was found later in the chaff pile. Clark and Comanor (1973) reported 12% plant parts from our area for their 4 days in April. We also found an average of 12% for all nests in our intensive study. These materials were not found in the chaff pile; therefore, they must have been used in some fashion in the nest.

It is interesting that Dr. Johanna Went found yeast only in the refuse heaps of ants out of all cultures of soil samples made in Death Valley and that Weber (1972: 87) stated: "The garden of *Cyphomyrmex rimosus minutus* and its close allies consists of fungal masses . . . of thickly packed cells that look like ordinary yeast." The fungus has been identified as *Leucoprinus gongylophorus* (Moeller) "a segregate of *Lepiota*" (p. 109). He concluded, concerning the stages of evolution of fungus-growing in ants: "In relation to these stages, the behavior of other ants might seem to be relevant, such as the harvesters that collect seeds and other vegetal matter. No other ants, however, appear to show any early stages in fungus culture. A common harvester, *Pheidole*, does resemble the attine ants and further study may show a relationship." (1972: 115.) We can now note that the larvae of *Pheidole* with a specialization index of 14 (Wheeler and Wheeler 1974 in press) and the larvae of *Cyphomyrmex* with a specialization index of 25 (subfamily Myrmicinae 20; family Formicidae 22) seem unlikely candidates for similar larval feeding habits. *Veromessor lobognathus* with a specialization index of 11 is an even less likely candidate. Body shape, mandible shape and body hairs are all markedly different between the fungus-growers and the seed-harvester larvae. (Wheeler and Wheeler 1974 in press.)

Went *et al.* (1972: 82) reported that the direction of the foraging column shifted in one direction 15° for each change. At Nest 8 this seemed to be true for the next direction of the column for several days; also there seemed to be a slight tendency to move 30° if one or more successive foraging columns had all followed the same direction; these periods of regular shifting were followed by periods of apparent random shifting of direction. In nests with more than one entrance, the patterns seemed much less predictable. It may be possible that when seeds are scarce foragers cover the foraging area carefully by shifting 15° in one direction and that in times of bounty—when foraging in any direction will yield profitable amounts of desired seeds—foraging trails are random. Double and triple columns seemed to be put out in response to favorable weather conditions, i.e., morning temperatures warm enough for rapid motion, with cloud cover which held the soil-surface temperature well below the lethal temperature. On 14 June 1973, with traces of rain, a cloud-cover, and moderate (28 C) air temperature, 3 columns were formed at Nest 8 and comprised about 15,000 workers; this was the largest number of foragers seen at this nest.

What determines the direction a foraging column will go we do not know. Ultraviolet light from the sky could not be used to orient the columns which form during the dark before sunrise. A trail-pheromone could be laid down in the afternoon to be used after dark as the column continues to forage after sunset. We doubt that *V. pergandei* orients "anemotactically" (Wehner and Duelli 1971) as reported for *Cataglyphis bicolor*, since the wind changes twice a day in Death Valley in the side-canyon.

We could find no evidence that *V. pergandei* used a trail-marking pheromone as reported by Wilson (1962) for *Solenopsis saevissima* (= *invicta*) neither by making the motion, nor by marks left on a mirror. However, they apparently did "recognize" rocks and gravel which had been part of the entrance to their nest and were moved into the foraging column. Entrance materials caused excitement, with workers wandering over them and returning to examine them. Similar-sized rocks and gravel, from the surrounding soil surface, did not elicit "recognition" nor cause any excitement. The entrance rocks and gravel may have been coated with some of the "cement" used to plaster the sand and gravel around the entrance and to coat walls of galleries and chambers in the nest. This may have been the cue for recognition.

Creighton (1953: 13) reported: "A patch of shade no more than 2 feet long causes many foragers to break out of the column and wander aimlessly about." We found that in the middle of winter in Deep Canyon when we used a metal walled trap to determine what seeds the ants were collecting that the ants went as far as the deep shadow of the trap-wall and milled around and returned to the nest. The next morning there were many entrances opened around the outside of the trap in the sunshine and the ants were busy travelling in the same direction and collecting seeds. (Went *et al.* 1972: 82–83.) We thought that this corroborated Creighton's hypothesis that *V. pergandei* needed direct sunlight for orientation. In Death Valley in May and June, however, when a 1 m shadow was cast across the foraging trail, the ants ignored the shade and continued normal foraging. We now wonder if the reduction in the heat in the middle of winter was enough to cause the stoppage which we observed in Deep Canyon. Creighton in 1952 may have ignored a temperature-controlled cue which the ants might have received

from air temperature when the mask was removed, or their black bodies may have received too much heat from direct sunlight and the ants may have warmed much faster than the light desert soil. No one has yet measured the internal body temperature of living ants under different meteorological conditions to see whether different colors of ant integument accounts for different responses to sunlight.

Marked ants released singly near their home nest, but not in the foraging column, frequently did not find their home nest; those released in columns did. Those single ants which did find their home nest wandered for a short time and then headed for the nest. They could not have found an old odor trail, since the trail pheromone must be volatile to be useful. (Wilson 1971: 252.) Furthermore, all columns we observed showed no sign that a trail was laid or that ants in the column were using an odor trail to orient to the food source.

Clark and Comanor (1973: 469) showed a decline in nest-workers with an increase in foragers for the 4 days in April; this activity pattern is similar to that reported by Creighton (1953). In May and June, by contrast, we found that the number of nest-workers increased from 20 to 30 while the foraging column was forming, and reached a peak of 200 to 300 ants between the hours of 2300 and 0100 while the foraging column was active. This might be due to the differences in the number of workers involved and to the warmer temperatures during our observations. Clark and Comanor observed no more than 325 ants outside their "nest" (= one entrance or crater?). This is a much lower count than we had. That so few ants could effectively cover an area 7.3 m^2 or even be dense enough so that the perimeter of the area could be mapped is puzzling.

Creighton (1953: 15) noted that gravel was brought by nest-workers as they (apparently) enlarged storage chambers; later husks were carried to the refuse pile. Finally, when all the seeds had been processed and the ants came out with empty jaws, workers were ready to go foraging again.

Creighton (1950, 1953) did not mention the species of seeds gathered by *V. pergandei.* Tevis (1958) listed a total of 14 genera collected in Deep Canyon. Eleven were collected from July to March (at the end of a 12-year drought) and 10 from April to June (after winter ephemerals had bloomed), but the percentages of species changed drastically. Clark and Comanor (1973) listed 4 genera for 4 days in April. Our list of seeds taken from the foragers and the refuse piles shows a much more varied composition: 42 species in 33 genera in 20 families.

ACKNOWLEDGMENTS

We hereby express our thanks to Dr. Frits W. Went, who very kindly identified the plants and seeds, but most of all, for his constant interest and imaginative assistance. We also thank Dr. George C. Wheeler, who was an active participant in all phases of this study. We thank the National Park Service for permission to use the study area; our special thanks go to numerous Death Valley National Mounument personnel who made our stay more profitable and enjoyable. We thank Lloyd Tevis for his collaboration at Philip L. Boyd Deep Canyon Desert Research Area (University of California, Riverside).

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A New Species of *Rhexinia* from Argentina

(Coleoptera: Pselaphidae)

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During a study of the genera of the tribe Euplectini we came across an undescribed species of the genus *Rhexinia* which had been set aside by the late Orlando Park in his collection at the Field Museum of Natural History, Chicago. This genus was revised by Park in 1952 at which time he placed *Rhexinia angulata* Raffray, 1890, and *Rhexinia versicolor* Raffray, 1908, from Central and South America in *Rhexinia* (sensu strictiore). The subgenus *Rhexiola* was created for two species from Mexico. The species described below is placed in the nominate subgenus by the presence of the following characters: Head transverse trapezoidal; pronotum subcordate with median longitudinal sulcus; and two separated mesosternal foveae.

KEY TO SPECIES OF *RHEXINIA* (SENSU STRICTIORE)

1. Head and prothorax strongly sculptured, each sculpture with short seta in center; first visible abdominal tergite with curved longitudinal carinae one-half length of segment .... *angulata* Raffray
   Head and prothorax without prominent scultpure; first visible abdominal tergite without longitudinal carinae 2
2. Basal depression of first abdominal tergite with sensory setae; each elytron with sutural and three discal foveae .... *tucumanensis* new species
   Basal depression of first abdominal tergite without sensory setae; each elytron with sutural and two discal foveae .... *versicolor* Raffray

Rhexinia (Rhexinia) tucumanensis, new species

(Figures 1–3)

Male (fig. 2). Head (excluding mouthparts) 0.36 mm. long, 0.56 mm. wide; pronotum 0.55 mm. long, 0.57 mm. wide; elytra 0.59 mm. long; abdomen 0.95 mm. long, 0.84 mm. wide. Head with vertexal foveae on line with posterior margin of eyes; postantennal foveae present on side of head with apodemes connected to those of vertexal foveae; two low rounded tubercles near posterior margin, separated by a distance slightly less than that separating vertexal foveae. Antennae not geniculate, segment I as long as segments III to VI, segments IX and X weakly hexagonal. Ventral head setae long, numerous, simple; venter longitudinally sulcate. Prothorax distinctly compressed dorsoventrally, with small but distinct anterior flange; pronotum with longitudinal and transverse sulci; procoxal foveae large. Profemur with broad oblique sulcus near apex (apparently for reception of tibia); setate carina on mesal face bordering sulcus. Elytra with sutural and three discal foveae; subhumeral fovea absent; epipleural sulcus