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# MÉMOIRES ORIGINAUX

## THE FIRST SOCIAL PARASITE IN THE ANT TRIBE DACETINI

by

William L. BROWN, Jr.

*(Museum of Comparative Zoology, Harvard University.)*

The subfamily *Myrmicinae* is, above all other subfamilies, a stock that has given rise to the most varied and most specialized kinds of social parasites. In the majority of cases, these parasitic myrmicines have obviously evolved from the same group or genus to which their respective hosts belong, and for some forms, it even seems possible that the host species itself may have been the direct ancestor of the parasite.

It is certain that parasitism has arisen many times independently among the myrmicines; the partial list below will illustrate this polyphyletic pattern. Each of the *genera* listed on the left is common, widespread, and has radiated profusely; each corresponding species listed to the right represents either a substantiated parasite or one assumed to be parasitic on the basis of good indirect evidence. Each parasite belongs to the same genus as the host, or to a genus very closely related phyletically.

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| *Myrmica* | *M. myrmecoxena* Forel. |
| *Manica* | *M. parasitica* Creighton. |
| *Pogonomyrmex* | *P. anergismus* Cole. |
| *Pheidole* | *Sympheidole elecebra* Wheeler. |
| *Aphaenogaster* | *A. tennesseensis* Mayr. |
| *Solenopsis* | *Paranamyrma solenopsidis* Kusnezov. |
| *Monomorium* | *Epoecus pergandei* Emery. |
| *Tetramorium* | *Teleutomyrmex schneideri* Kutter. |
| *Leptothorax* | *L. duloticus* Wesson. |
| *Crematogaster* | *C. ranavalonæ* Forel. |
| *Acromyrmex* | *Pseudoatta argentina* Gallardo. |

The majority of parasitic species is known from Europe, North Africa, North America and Argentina, suggesting that parasitism may be favored by temperate or even cold climate. However, it should be remembered that it is these very same areas where most of the intensive collecting and

biological examinations of ants have been carried out up to the present, whereas few tropical ant species have been studied at all beyond the stage of original description.

This paper is concerned with the description, and a brief discussion of the biology, of the first verified social parasite among the Dacetini—a member of the dominant and widespread genus *Strumigenys*. This is also the first verified parasite reported from among the ants of Australia, though it seems likely that at least a few of the species already known in *genera* such as *Monomorium*, *Crematogaster* and "*Bothriomyrmex*" may be parasites (1). Since the new species shows every evidence of being a workerless obligatory parasite on the common Australasian species *Strumigenys perplexa* (F. SMITH), of which *S. leæ* Forel is a synonym, a comparative description will be most useful. *S. perplexa* ranges widely in the moister parts of southeastern and southwestern Australia, Tasmania and the North Island of New Zealand, as well as various adjacent oceanic islands, and over most of this area it is the only, or at least the only common, member of its genus.

### *Strumigenys xenos* sp. nov.

Holotype female, winged: TL 2,4 mm., HL 0,57 mm., ML 0,20 mm., WL 0,64 mm., CI 75, MI 35, forewing L 2,1 mm. (Measurements and their symbols correspond to those of my other papers on dacetine taxonomy; cf. Brown, 1953, *Amer. Midl. Nat.*, 50: 7-15.)

Resembling the female of *S. perplexa*, but somewhat smaller and with shorter mandibles. Also the following qualitative differences:

1. Mandibles more distinctly arcuate and slightly broader at the base, nearly twice as broad near base as at preapical tooth; tilted slightly dorsad and otherwise intermediate in general appearance between those of *S. perplexa* and the "*Labidogenys*" group of species, such as the northern Australian *S. emdeni* Forel. Apical and preapical teeth smaller and more slender than in *S. perplexa*, the preapical directed strongly obliquely apicad and nearly as long as the dorsal apical tooth.
2. Propodeal teeth and *lamellæ* weakly developed, the *lamella* subcariniform and without well-defined lower lobes or angles.
3. Spongiform appendages not so well developed; posterolateral petiolar lobes tiny, transparent; postpetiolar appendages leaf-like, transparent, and somewhat shrunken, without the abundant minute areolation and vesiculation of *perplexa* females. Anterior gastric margin with a reduced transparent border. Gastric costulation fine and close, extending about 1/4 the length of the basal segment. Postpetiolar disc and remainder of gaster smooth and shining.
4. The pilosity consists of an even, abundant growth of fine, mostly whitish erect hairs, each weakly curved and usually with truncate apex, covering both dorsal and ventral surfaces of head and gaster, dorsum of alitrunk, nodes, legs and scapes. Hairs on funiculi, mandibles and tarsi shorter, finer, pointed, largely reclinate or appressed.

(1) The ant described as *Bothriomyrmex wilsoni* Clark, 1934, Mem. Nat. Mus. Victoria, Melbourne, 8, 39, pl. 3, fig. 5, worker, from South Australia, was supposed by its author to be a parasite of a *Crematogaster* species. From the evidence cited, the association could just as easily have been a chance or plesiobiotic one, such as I have often found under stones in South Australia and Victoria. At any rate, Clark's description and figure seem to me to fit best, not the dolichoderine *Bothriomyrmex* or its Australian counterparts, but a worker of *Plagiolepis*, of subfamily *Formicinæ*. The types of *B. wilsoni* need to be checked against this surmise.

The erect hairs, which are at least three times as abundant as in *perplexa*, and longer on the average, are shortest beneath the head and longest on the gaster; in the latter position, the individual hairs are mostly longer than the greatest thickness of the posterior coxa (maximum length of hairs ca. 0,11 mm.). As seen at a magnification of 80X, the apices of the hairs are mostly blunt, or even feebly enlarged, but are not nearly so distinctly broadened as are the corresponding hairs of *perplexa*.

5. Color not very significantly different from that of *perplexa*; uniform medium ferruginous, gaster scarcely if at all darker. Head not infuscated, except for the ocellar region. Appendages lighter. Wings clear, abundantly microtrichiate; M obsolete beyond basalis; *r* distinct; Rs + M lacking, and Rs therefore basally detached, its remainder present only as a feebly pigmented furrow, not reaching wing margin. Posterior wing with a single vein near anterior margin, ending before midlength in a feeble clavation. Hamuli 4, feeble, situated beyond midlength. A small difference of doubtful importance lies with the short anteromedian mesonotal carina, which is more distinct in *xenos*, and surrounded by a feebly impressed area which forms a pit-like region at the posterior end of the carina.

The two paratypes show very little perceptible variation away from the holotype; the measurements and proportions are scarcely beyond the expected errors. In one specimen, the gastric pilosity reaches nearly 0,13 mm. in length; degree of infuscation of gaster and of ocellar triangle vary slightly among the holotype and two paratypes.

Holotype [Museum of Comparative Zoology] taken on the lower slopes of the Warburton Range, just above Warburton, Victoria; altitude about 400 M. The collection was made from a nest of *S. perplexa* in a small rotten log in a tree fern gully remnant surrounded by cleared pasture slopes, January 9, 1951 (W. L. Brown).

Paratypes : two dealate females. First paratype [South Australian Museum] taken under a stone in a nest of *S. perplexa*; wet, dark fern gully at Ferntree Gully Park, Victoria, during August, 1951 (Brown); this is the specimen upon which live nest observations were made (see below). Second paratype [destroyed in shipment] taken with one dealate *S. perplexa* female, one *perplexa* worker, and a small amount of brood, beneath a stone on the west (bay side) slope of Arthur's Seat [Mt.] at about 130 m. altitude, McCrae, Victoria, during April, 1951. This collection was made in medium rainfall sclerophyll forest, on granite (*Eucalyptus obliqua*, *E. radiata*, *E. viminalis*, *Banksia* sp.); undergrowth scanty, some grass (Brown). These localities are widely separated, and are all to the east or south of Melbourne.

## BIOLOGY

This species was first detected in the collection at Arthur's Seat. This collection attracted attention because the total catch, apparently representing an incipient colony, consisted of one dealate *perplexa* female, the dealate parasite female, and one *perplexa* adult worker, plus a small amount of brood. The parasite was at first mistaken for a second *perplexa* female, but the circumstances were odd enough (for an incipient nest) to call for careful examination of each of the specimens. The unusual characteristics of the *xenos* female were apparent at once under the microscope. It being realized that I had collected only a small proportion of the many *S. perplexa* colonies seen during my Australian tour, I nevertheless examined all the alcoholic storage material of this species I had accumulated, and luckily brought to light the winged female (holotype) from the Warburton Range colony. This winged specimen was accompanied in the vial by two dealate females of *perplexa* and a number of

*perplexa* workers, representing only a part of the nest opened. My field notes do not indicate that more than this single winged form was seen in the nest, but my examination of the log containing the nest was recalled as a hurried one; at the time of collection, nothing unusual was expected of a colony of the common *perplexa*. None of the other *perplexa* colonies among my alcohol duplicates contained any *xenos*.

I then began an intensive search in the Dandenong Ranges, near Melbourne, and at the end of the winter in 1951, I finally succeeded in finding a single dealate *xenos* female in a *perplexa* nest consisting of 4 dealate queens and about 130 workers. The entire nest was secured alive, and with several other pure *perplexa* nests was placed under observation in glass-topped plaster chambers well provided with various live collembolans, previously found to be the prey of *perplexa*.

In the plaster nest, *S. xenos* showed markedly different behavior from the *perplexa* queens. The *perplexa* workers constantly surrounded her to the number of 3-10 at one time, and usually held her near to the brood pile. The workers were seen continually to ply their glossae over her head and alitrunk, or to hold these parts gently between the tips of their mandibles. The workers showed no signs of hostility, such as threatening or striking from the wide-open position of the mandibles, during four days of observation. When the nest was disturbed sufficiently to initiate portage of the brood by the workers, the *xenos* queen was also carried off in the mandibles of a worker (or more than one worker); for such portage, she folded her head downward and her appendages inward in a sort of pupoidal pose, rigidly held. The *perplexa* queens mostly shifted for themselves, as in pure nests, and even foraged and successfully caught collembolans on occasion; the reaction of the workers to their presence apparently was very little if any stronger than the reaction of the same workers to their worker mates. By contrast, the sedentary *xenos* female invariably drew the attention of every worker passing by her.

In observing certain other species of *Strumigenys*, I have sometimes noticed, in cases where virgin queens have accumulated to excessive numbers in exitless plaster nests, a similar kind of behavior of workers toward these females, but in such nests, the females were attended each by only a single worker, following, restraining and hauling them day and night, often for weeks at a time. The result of such maneuvers, however, was always the ejection of the females from the brood chamber, and, though the wings had always been removed previously, this may have represented a normal attempt at forcing dispersal of the females surplus to the nest. In these cases, the female has never been observed to "fold", instead, she usually seems to be trying to escape the persistent attentions of the worker in a feeble, half-hearted sort of way, and at times the worker is forced to lift her clear of the chamber floor in order to disengage her tarsal claws.

*Xenos*, in contrast, always attracted more than one worker at a time, and the workers appeared to be trying to get her as close to the brood as

possible. At all times, she remained quietly crouching under a mob of workers. After four days in the original host colony, the *xenos* female was removed to a pure *perplexa* colony of about 80 workers and 2 queens in a similar plaster nest. Adoption was immediately successful, and behavior of the parasite female and the new host workers was the same in all respects as it had been in the original host nest. One of the *perplexa* queens from the original nest was then transferred to the second nest, where the new workers reacted to her presence by the open-mandible threat pose, briefly held, on the first few contacts. After this, the *perplexa* queen was treated just about in the same way as were the two queens belonging to this nest, and she soon found her way to the brood and the side of these two queens. Acceptance of this foreign *perplexa* was accomplished with little difficulty, agreeing with other similar queen transfers tried with this species and with some other dacetine species. The workers of the new colony were almost indifferent to the foreign *perplexa* queen as compared to their frenzied acceptance of the *xenos* female.

It was not possible to continue observations of *xenos* in the artificial nest because of travel plans elsewhere in Australia, but the observations completed during about one week convince me that *xenos* is an obligatory and workerless parasite of *perplexa*. Unfortunately, I was unable to determine how the *xenos* female fed, or whether she laid any eggs during this period.

In no one of the three nests harboring *xenos* females could any trace of workers other than the usual *perplexa* caste be found, despite very careful checking of the latter. Females of *xenos* were never found apart from *perplexa* nests, and no workers corresponding well to the unique pilosity and other characters of the *xenos* female have ever been found in any situation. Two stray workers of a new but undescribed form allied to *perplexa* have unusually long, fine pilosity, but this does not correspond well to the pilosity of *xenos*, and the mandibular and other differences are also clear; I believe these workers have no connection with *xenos*.

The coexistence of the *xenos* and one or more *perplexa* queens in a single colony is an interesting feature of this case, and since it has been found on three separate occasions at different localities, it is hardly to be doubted that it is the usual situation. In some quarters, it has long been asserted that socially parasitized colonies could not maintain host and parasite queens for an indefinite time together. However, we now have well-studied cases available in which host queen and parasite queen (more than one parasite queen in *Teleutomyrmex*) can tolerate each other and remain together for long periods in a single colony.

***Résumé.***

*Strumigenys xenos* sp. nov. a été trouvée en Australie dans les sociétés de *Strumigenys perplexa* (F. SMITH). Sa description est faite en comparaison avec l'espèce hôte.

Il s'agit de la première espèce de Fourmi parasite connue d'Australie. Elle n'a sans doute pas d'ouvrières. Les femelles cohabitent dans le nid avec celles de l'hôte, mais sont traitées bien différemment par les ouvrières de *S. perplexa*. Tandis que celles-ci ne portent guère d'attention à leurs propres reines (guère plus qu'aux autres ouvrières), elles entourent constamment la femelle *xenos*, la lèchent, la maintiennent dans leurs mandibules, la transportent en cas de déménagement et l'entraînent le plus près possible du couvain. Transportée dans une autre société de *S. perplexa*, la femelle *xenos* est adoptée immédiatement et est l'objet du même traitement ; tandis qu'une reine *perplexa*, ainsi transportée de sa société dans une autre société de sa propre espèce, n'est acceptée qu'après une brève période d'hostilité.

Ces observations montrent que *S. xenos* est un parasite obligatoire et sans ouvrières de *S. perplexa*. L'alimentation de la femelle *xenos*, ni la ponte n'ont pu être observées.