SOME ABERRANT SPECIES OF CAMPONOTUS (COLOBOPSIS) FROM THE FIJI ISLANDS

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In a recent paper[1] on some Fijian Formicidae, Dr. F. Santschi describes and figures a remarkable ant as *Camponotus bryani* and makes it the type of a new subgenus, Condylomyrma. Concerning its affinities he remarks that "it seems to be near the subgenus Karavaievia Emery but differs mainly in its petiole and perhaps in dimorphism, if this should be established

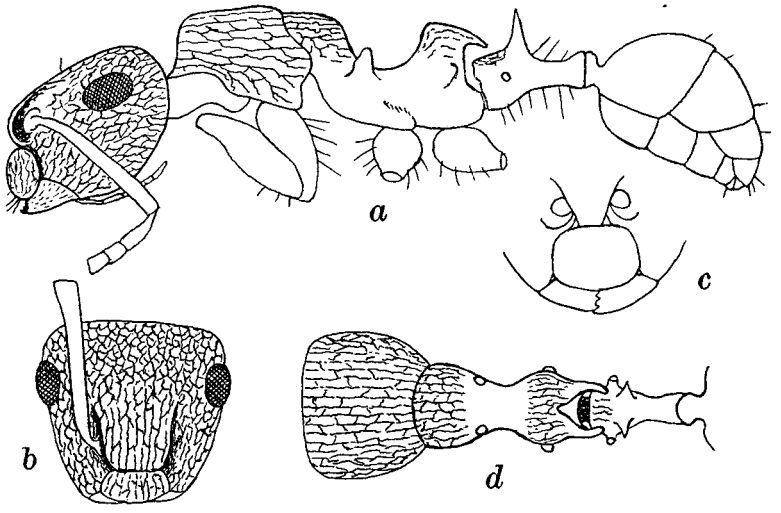

Fig. 1. *Camponotus* (*Colobopsis*) *bryani* Santschi; *a*, worker in profile; *b*, head, dorsal aspect; *c*, mandibles and clypeus, anterior aspect; *d*, thorax and petiole, dorsal aspect. (After F. Santschi.)

eventually. In the latter case, *Camponotus dentatus* Mayr should be added to *Condylomyrma*." The very striking appearance of the insect is clearly shown in Santschi's figure, which is here reproduced (Fig. 1). I find that the large amount of material collected by Dr. W. M. Mann on his expedition to the Fiji Islands in 1915–'16 and in part most generously deposited in my collection and in that of the Museum of Comparative Zoology, makes it possible to give a more satis-

[1]Fourmis des iles Fiji, Rev. Suisse Zool. 35, 1928, pp. 67–74, 2 figs.

factory interpretation of the affinities of *C. bryani* than that advanced by Santschi. The key to these affinities proves to be *C.* (*Colobopsis*) *dentatus*. My discussion is therefore best introduced by a brief account of this species.

Mayr described and figured *C. dentatus* as long ago as 1866[2] from a minor worker taken on the island of Ovalau, but little was known of the species till Mann collected numerous specimens from no less than fourteen localities on seven of the Fijian islands and described the four castes.[3] During January 1932 I also took specimens of *dentatus* at Suva, running on tree-trunks. As Mann says, "*C. dentatus* is not confined to the forests, but lives also among scrubby vegetation near the coasts or in cultivated districts." Like other species of Colobopsis it undoubtedly nests in the dead twigs or wood of standing trees. Mann's figures of the soldier (worker major) and worker (worker minor) are here reproduced as Fig. 2. *C. dentatus* exhibits not only this very pronounced dimorphism of its worker castes—a condition common to most species of Colobopsis—but also peculiar differences in their sculpture since the soldier has the posterior portion of the head and the whole thorax smooth and shining, whereas these parts in the worker are subopaque and rugose. Furthermore, specimens from different localities display considerable variation in the shape of the thorax and petiole, in sculpture and coloration, so that *dentatus*, which is so common and widely distributed over the Fiji Islands, may be said to constitute a "Formenkreis" or congeries of forms of the same phylogenetic origin. Among the material before me it is possible to recognize several races or varieties, some of which are indicated in Fig. 3. The workers of one of the more extreme forms (Fig. 3, *g* and *h*), from Nadarivatu, on Viti Levu Island differ from all the others in having the pronotum distinctly subcordate anteriorly, rising so steeply in front as to overhang the neck, with the humeri large, expanded and submarginate, on their dorsal surfaces with subtriangular foveae, and with the sides straight and converging posteriorly. The epinotum has long, spatulate, subparallel and somewhat deflected spines. This form may be designated as subsp. *humeralis* subsp. nov. I have not seen

[2]Sitzungsb. Akad. Wiss. Wien 53, 1866, p. 493, Fig. 5.

[3]The Ants of the Fiji Islands. Bull. Mus. Comp. Zool. 64, 1921, pp.401-499, 38 figs.

specimens of the soldier. It will be noticed, incidentally, that the worker of one of the other forms (Fig. 3 *e*) shows a distinct approach in the shape of the mesoëpinotal impression and base of the epinotum to *C. bryani*. I shall return in the sequel to some of the variations in the soldiers.

Now on examining series of *dentatus* given me by Dr. Mann in 1916 and others which he sent me very recently, I find two forms, one represented by three workers, the other by two

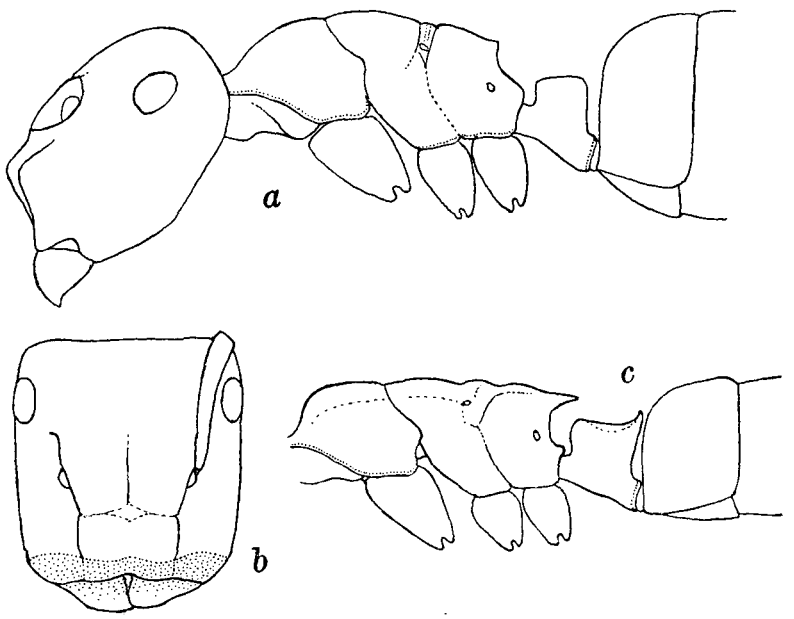

Fig. 2. *Camponotus* (*Colobopsis*) *dentatus* Mayr. *A*, soldier, in profile; *b*, head, dorsal aspect; *c*, thorax and petiole of worker in profile. (After W. M. Mann.)

workers and a male, which are very similar to Santschi's *bryani*, but with equally pronounced similarities to *dentatus*. In fact, their resemblance to the latter in size, color and sculpture is so close that Mann and I had quite overlooked them among the *dentatus* series in our collections. I describe and figure (Fig. 4) one of these annectant forms below as *manni* sp. nov., the other as its subspecies *umbratilis*. There can be no doubt that these forms as well as *bryani* have soldier castes very similar to that of *dentatus*, but, unfortunately, they are either not represented in our series or are so much like the *dentatus* soldiers as not to be distinguishable. The *dentatus* Formen-

kreis, therefore, so far as known, consists of a number of varieties and subspecies and at least two forms, *bryani* and *manni*, which have deviated so far from the type and lesser races as to seem deserving of specific rank.

Camponotus (Colobopsis) manni sp. nov.
(Fig. 4, *a, c, h*)

Worker.—Length, 3-4 mm.

Head precisely like that of the worker *dentatus*, as broad or very nearly as broad as long, distinctly narrower in front than behind, convex dorsally and ventrally, with feebly rounded sides and distinctly convex posterior border. Mandibles small and narrow, 5-toothed. Clypeus moderately convex, with distinct median and lateral portions, the former transversely elliptical, nearly twice as broad as long, the latter minute and triangular. Eyes rather small and round, moderately convex. Frontal carinae prominent, feebly sinuate, diverging posteriorly; frontal area and groove obsolete. Antennal scapes curved at the base, thickened at their tips which extend about one-fourth their length beyond the posterior border of the head. Pro- and mesonotum as in *dentatus*, the pronotum very broad, broader than long, rising rather abruptly from the neck, somewhat depressed above, obscurely submarginate on the sides. Promesonotal suture strong, impressed, arcuate; mesonotum much smaller than the pronotum, subelliptical, somewhat broader than long; mesoëpinotal suture distinct, but much less pronounced than the promesonotal; mesoëpinotal impression large and selliform, like that of *bryani* but somewhat shorter and shallower. Metanotal spiracles large, on distinct tubercles which project dorsally above the impression. Epinotum longer than broad, its base concave in the middle, terminating posteriorly in two slender, subparallel, somewhat spatulate and posteriorly converging spines, which are directed backward and in some specimens slightly upward; in profile the base of the epinotum seems to slope upward and backward, owing to the development on each side of two somewhat overlapping welts or thick marginations, the more posterior of which is continued along the lateral border of the spine of the same side; epinotal declivity very abrupt, almost semicircularly concave in profile; metasternal angles rectangular. Petiole elongate, with very distinct anterior peduncle; node subcuboidal, somewhat longer than broad, longer than high; in profile with straight, perpendicular anterior and posterior surfaces and anteroposteriorly concave dorsal surface; from above somewhat broader in front than behind, with the sides concave and the dorsal surface strongly marginate anteriorly, laterally and posteriorly. The anterior margination forms a pair of low, rounded lobes, the posterior corners are prolonged as a pair of straight, tapering, blunt-tipped spines, which are about half as long as the height of the node and are directed upward, backward and outward. Posterior peduncle of petiole very long, but distinctly shorter than in *bryani*, only about half as long as the node. Petiolar spiracles large, tuberculate, projecting laterally.

Gaster and legs as in the worker of *dentatus*, the former much larger than the head, with small anterior condyle, the latter rather stout; fore femora somewhat enlarged.

Head, pro- and mesonotum subopaque; the mandibles, clypeus, head, pro- and mesonotum longitudinally and rather irregularly rugose; the rugae moderately coarse, anteriorly converging on the clypeus, becoming distinctly reticulate only on the extreme occiput, those on

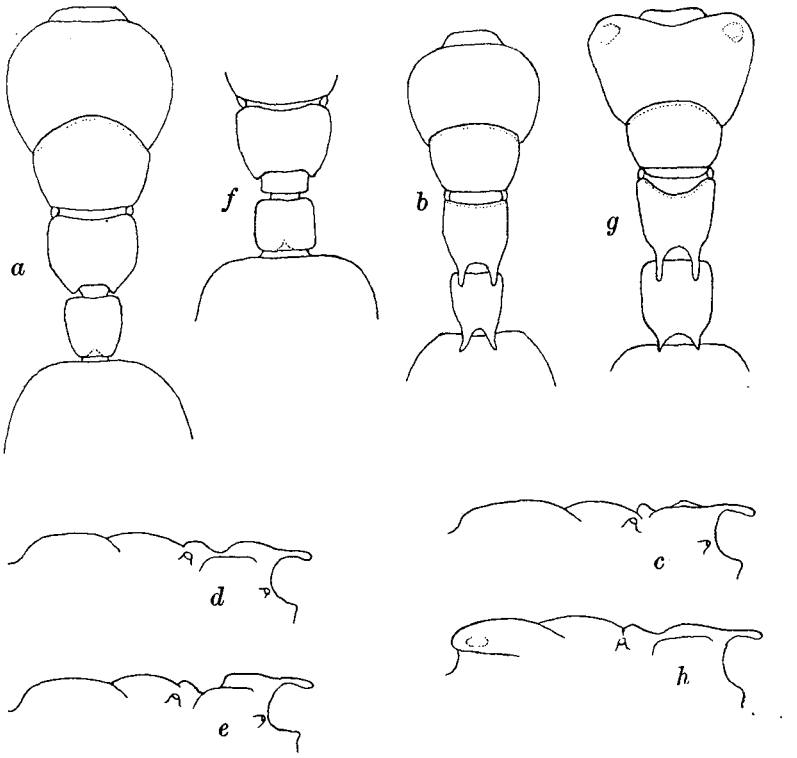

Fig. 3. Various forms of *Camponotus* (*Colobopsis*) *dentatus* Mayr; *a*, thorax and petiole of soldier; *b*, of worker, and *c*, dorsal profile of thorax of latter from specimens from Nagasau, Fiji; *d*, dorsal profile of worker from Ovalau; *e*, of worker from Laruka; *f*, epinotum and petiole, dorsal aspect, of soldier from Somo Somo; *g*, dorsal aspect of thorax and petiole of worker of subsp. *humeralis* subsp. nov. from Nadarivatu; *h*, dorsal profile of thorax of same.

the pronotum coarser than on the head; on the mesonotum finer and vermiculate-reticulate; mesopleurae, epinotum, petiole, gaster and legs much more shining; mesopleurae and sides of epinotum coarsely and obliquely rugose; base of epinotum very loosely and irregularly rugulose, declivity, petiole and gaster smooth. Antennal scapes opaque, finely and densely granular; legs shagreened and sparsely punctate; gaster very smooth and shining, sparsely and indistinctly punctulate.

Hairs and pubescence white, the former even sparser than in *bryani*, distinct only on the ventral surface of the petiole and gaster, mandibles and anterior border of clypeus; the pubescence short and appressed, sparse on the legs, very dilute on the gaster, fine and dense on the funiculi.

Head and gaster black; posterior borders of gastric segments yellowish; mandibles, clypeus, anterior borders of cheeks, thorax and petiole red; antennae and legs slightly paler and more yellowish, tips of funiculi infuscated.

Described from three workers taken by Dr. Mann at Somo Somo, Taviuni Island, in my collection and one in the collection of the Museum of Comparative Zoology. One of these (Fig. 4 *h*) is peculiar in possessing a pair of large, irregular tubercles on the anterior surface of the base of the epinotum so that the profile outline of this region is much more like that of *C. bryani*. Apart from this exception, *manni* differs from *bryani* in the very different shape of the epinotal base, the shorter and somewhat shallower mesoëpinotal impression, the distinct anterior and much shorter posterior peduncle of the petiole, the distinct anterodorsal lobes and shorter spines of the node, the much smaller condyle of the gaster and much larger size of the latter. There are also differences in sculpture and color as indicated in the description.

Camponotus (Colobopsis) manni subsp. **umbratilis** subsp. nov.

(Fig. 4, *d* and *e*)

Worker.—Length, 3.5 mm.

Differing from the typical *manni* in sculpture and coloration. Head, pro- and mesonotum more shining, reticulately rugulose, the rugae finer and more irregular than in *bryani*, longitudinal only between the frontal carinae and on the posterior portion of the pronotum. Gular surface of head smooth and shining. Antennae, femora and tibiae dark brown; lower pleurae, coxae and ventral surface of petiole blackish. The spines and posterior peduncle of the petiole are of the same length as in *manni*.

Male.—Length, 4.4 mm.

Indistinguishable in form, sculpture and color from the male of *dentatus*, except in the shape of the petiole (Fig. 4, *d* and *e*), which is cylindrical and without trace of a node, with straight horizontal dorsal surface; from above decidedly broader in front than behind, with each of the anterior corners produced as a rounded tubercle, bearing the spiracle on its summit. In typical *dentatus* the petiole (Fig. 4, *f* and *g*) is thicker, convex above, less widened anteriorly and with the spiracles on the anterolateral surfaces.

Described from five workers and a male from Nadarivatu, on Viti Levu Island (W. M. Mann). Three of the workers are in the Museum of Comparative Zoology. In sculpture and color this subspecies shows a distinct approach to *C. bryani*, which was also taken on Viti Levu (at Golo-i-Sova, by E. H. Bryan).

Admitting, as I believe we must, that *C. dentatus, humeralis, manni, umbratilis, bryani* and no doubt several other forms yet to be discovered in the Fiji Islands are all closely related members of a single Formenkreis, the question arises as to

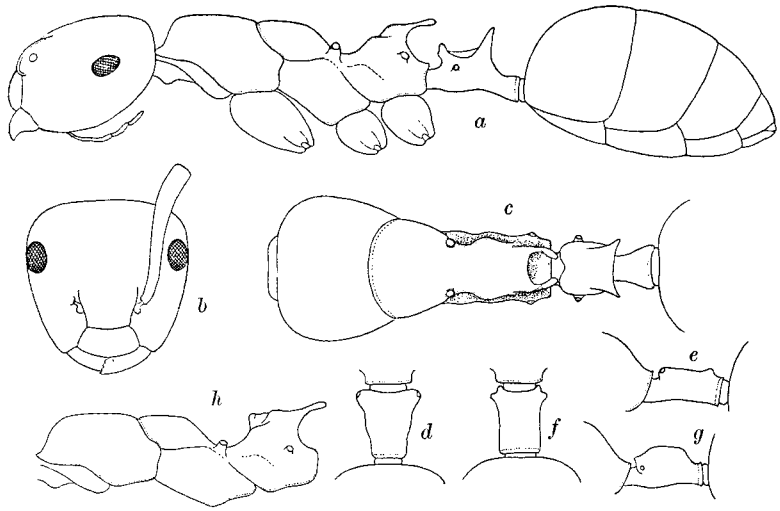

Fig. 4. *Camponotus (Colobopsis) manni* sp. nov.; *a*, worker from Somo Somo in profile; *b*, head of same, dorsal aspect; *c*, thorax and petiole of same, dorsal aspect; *d*, petiole of male of *manni* subsp. *umbratilis* subsp. nov., from Nadarivatu, dorsal view; *e*, same in profile; *f* and *g*, corresponding views of petiole of male *C. dentatus; h*, thorax in profile of a worker variant of *C. manni* from same colony as *a*.

whether we should retain them in Mayr's subgenus Colobopsis or follow Santschi in isolating them as an independent subgenus, Campylomyrma. We might readily decide in favor of the latter alternative, were it not for certain morphological considerations and a certain taxonomic policy which has been pursued hitherto in the progressive splitting of huge genera like Camponotus into subgenera. The practical advantages of subgeneric isolation of the small *dentatus* Formenkreis are slight and would be more than offset, perhaps, by the disadvantages of detaching these ants from their very close allies

in the old subgenus Colobopsis. This becomes clearer when we examine Santschi's diagnosis of Campylomyrma. Of the various characters which he assigns to this subgenus only one, the presence of paired spines on the epinotum and petiole, seems to be important, and if the unknown soldier, which must be very similar to that of *dentatus* is taken into consideration, this character loses much of its significance. Since, in the past, subgenera of Camponotus have been based by tacit convention on the characters of the major or maxima worker (soldier) and not on those of the minor, we may glance for a moment at the conditions in *C. dentatus*. In typical soldiers of this species from Ovalau (Fig. 2 *a*,) the epinotum is not bispinose as in the worker but only bidentate and the petiolar node is only feebly bilobed behind. In the female even these teeth and lobes are absent. There may be a considerable farther reduction of these structures in the soldier also, as in the one from Somo Somo (Fig. 3 *f*), where the epinotal teeth are represented by slight lateral protuberances and the petiole has only a vestige of lobulation. I submit that such characters can hardly be regarded as having even subgeneric value.

Emery, in the Genera Insectorum (1925), assigned *C. dentatus* to the fourth of his five groups ("*dentatus* group") of Colobopsis, including also *C. guppyi* Mann of the Solomon Islands and *C. aurelïanus* Forel of Sumatra, and he seems to have based this group not only on the epinotal dentition of the soldier but also on the character of the cephalic truncation, which is indeed less pronounced than in many species of Colobopsis. This character varies greatly, however, in the subgenus, even in the first of his groups which includes the type, *C. truncatus* Spinola. He certainly did not consider his various groups sufficiently differentiated to merit subgeneric names. His long and arduous study of the huge genus Camponotus, which comprises more than a thousand forms, and his desire to express the true phylogenetic affinities in his subgeneric and group divisions, led him to proceed with great caution. I have been deeply impressed by this laudable quality of his work while I was undertaking a revision of another subgenus of Camponotus, namely Myrmocladoecus Wheeler, which presents the problem I have been discussing even more explicitly than the subgenus Colobopsis.

Myrmocladoecus contains some fourteen species, confined to tropical America and nesting, like Colobopsis, in hollow stems and twigs. The workers are not strongly dimorphic as in Colobopsis but pleomorphic, as in most of the other subgenera of Camponotus, that is, with mediae or intermediate forms connecting the extreme maximae and minimae. But the smallest workers of the various species of the subgenus Myrmocladoecus show an extraordinary range of structure,

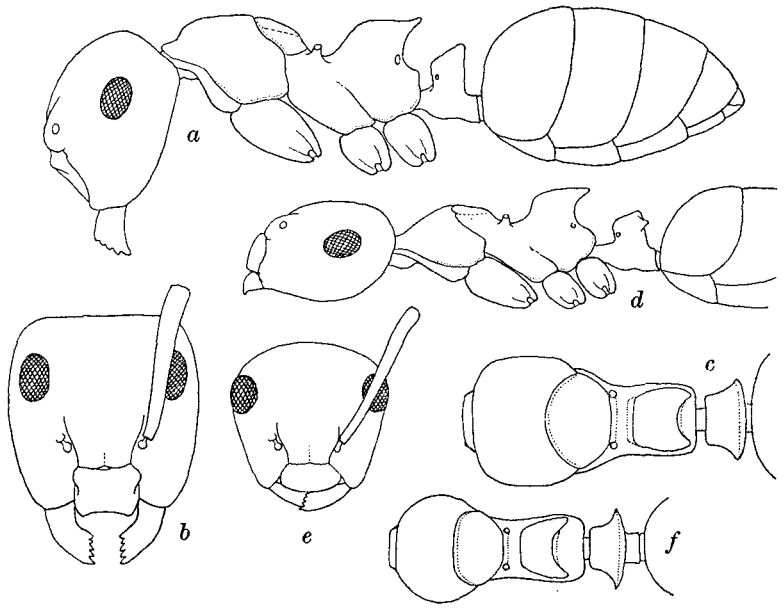

Fig. 5. *Camponotus* (*Myrmocladoecus*) *corniculatus* sp. nov. of British Guiana; *a*, worker maxima in profile; *b*, head of same, dorsal aspect; *c*, thorax and petiole of same, dorsal aspect; *d*, worker minima in profile; *e*, head of same, dorsal aspect; *f*, thorax and petiole of same, dorsal aspect.

from forms with the thorax and petiole not very unlike those of the usual Camponotus type to forms that bear a striking resemblance to *Colobopsis bryani*. The fourteen known species may, in fact, be arranged in a series, beginning with *planus* F. Smith, *tripartitus* Mayr, *hedwigae* Forel and *rectangularis* Emery, which depart from the usual Camponotus type only in the sharp margination of the sides of the thoracic dorsum and in some cases also of the posterior border of the base of the epinotum. In these species the petiole is still of the usual squamiform Camponotus structure. In the next portion of

the series, including *latangulus* Roger, *bispinosus* Mayr, *dalmasi* Forel, *mucronatus* Emery, *bidens* Mayr and *sanctaefidei* Dalla Torre, the posterior border of the epinotum becomes bilobed, bidentate or bispinous and the petiolar scale exhibits a peculiar "morphological restlessness," becoming thick and nodiform and in some of the species flattened above or furnished with a median spine or lateral teeth. The series terminates with a group comprising *callistus* Emery, *raphaelis* Forel, *hippocrepis* Emery and *corniculatus* Wheeler (MS) (Fig. 5), in which the mesoëpinotal impression is very deep and rounded, with protruding, tubular spiracles and the petiole further modified in the direction suggested by *sanctae-fidei.*

The largest workers of the various species in the Myrmocladoecus series also exhibit a graduated parallel development in the form of the soldier's head, which in *planus* and *rectangularis*, for example, is of the ordinary Camponotus type, to conformations like those of *sanctaefidei*, *callistus* and *corniculatus* (Fig. 5 *b*) in which it strongly suggests certain species of Colobopsis and allied subgenera. This tendency to acquire a truncated front like that of the Colobopsis soldier is obviously an independent development within the Myrmocladoecus series in adaptation to increasingly phragmotic habits, or the guarding of narrow, tubular nest-galleries. It emerges again and again in very distantly related genera and even subfamilies of ants. Now even a moderate "splitter" might be inclined to resolve Myrmocladoecus into three small subgenera of four to six species each, but should he undertake this task he would encounter great difficulties in defining the subgeneric boundaries, he would incur the risk of dissociating what is obviously a single phylogenetic complex or series, and his gains would not be notable. I believe, therefore, that the cautious myrmecologist will refrain from dividing the subgenus into several subgenera. But supposing that only a few species of Myrmocladoecus were known, say *rectangularis* and *latangulus*, and that I were presented with a few small workers of *corniculatus*, I should be tempted, and would probably yield to the temptation, to make it the type of a new subgenus. This is what has happened to my distinguished friend Dr. Santschi in a precisely analogous situation, since he has yielded to the temptation to found a subgenus on an aberrant minor worker suprisingly like the same caste of *corniculatus* and belonging to a small and imperfectly known group of Fijian Colobopsis.