

Article XVIII.—THE ANTS OF JAPAN.

By WILLIAM MORTON WHEELER.

PLATE XLI.

The following paper is based on a larger collection of ants made by Mr. Hans Sauter, mainly at Okayama, Kanagawa, and Yamanaka during the summer of 1904 and the spring of 1905 and sent me by Mr. Alan Owston of Yokohama, and some smaller collections from Misaki and other localities, sent me by Professor J. F. Abbott and Dr. W. H. Ashmead. Although this material has enabled me to recognize a number of the forms described by previous myrmecographers and to add several new ones, it is nevertheless true that our knowledge of the Japanese ant-fauna still remains very meager and unsatisfactory. Of very few of the species are all the castes known, and the published descriptions have often been drawn from a few or even single specimens. Moreover, ants have been collected in only a few localities of the Japanese archipelago. Probably, therefore, the described species and varieties will suffer considerable amendment when more material becomes available. The Japanese themselves seem to have paid little attention to the ants, unless perchance the results of their studies on these insects are embodied in works in their own language inaccessible to the occidental student.

Meager as are the materials at hand, however, they nevertheless throw considerable light on the geographical distribution of the Formicidæ in Eastern Asia. Forel called attention to the fact that the ant-fauna of Japan "consists of a mixture of palearctic and Malayan stocks, the latter confined for the most part to the southern portion of the archipelago." He fancied he could detect also "certain very interesting nearctic affinities, for example in *Camponotus pennsylvanicus* var. *japonicus* and *Formica fusca* var. *nipponensis*." I believe that these affinities are somewhat doubtful. *C. japonicus*, being probably as closely related to certain Old World forms of *herculeanus* as it is to our common North American forms, should probably constitute a distinct subspecies of *herculeanus* independent of *pennsylvanicus*, and *F. nipponensis* is certainly as distinct from

our North American var. *subsericea* as it is from the typical *fusca* of Europe.

There is, of course, no question as to the closer relationship between the Japanese ant-fauna and that of the adjacent East Asiatic continent. The complexion of the former, however, is altered by the intrusion, mainly, as Forel suggests, in the southern part of the archipelago, of a number of forms with strong Malayan or Indian affinities, in some cases even identical with the species of southern Asia. Such are the following:

<i>Euponera solitaria</i> ,	<i>Strumigenys lewisi</i> ,
<i>Pheidole nodus</i> ,	<i>Iridomyrmex itoi</i> ,
<i>Monomorium floricola</i> ,	<i>Iridomyrmex abbotti</i> ,
<i>Monomorium nipponense</i> ,	<i>Technomyrmex gibbosus</i> ,
<i>Monomorium triviale</i> ,	<i>Colobopsis rothneyi</i> ,
<i>Vollenhovia emeryi</i> ,	<i>Polyrhachis lamellidens</i> .
<i>Pristomyrmex japonicus</i> ,	

The relationship of the Japanese to the European and North Asiatic ant-faunas is beautifully shown in the following list of identical species:

<i>Myrmecina graminicola</i> ,	<i>Lasius fuliginosus</i> ,
<i>Solenopsis fugax</i> ,	<i>Lasius flavus</i> ,
<i>Cremastogaster sordidula</i> ,	<i>Formica rufa</i> ,
<i>Myrmica lævinodis</i> ,	<i>Formica sanguinea</i> ,
<i>Myrmica lobicornis</i> ,	<i>Formica fusca</i> ,
<i>Tetramorium cæspitum</i> ,	<i>Camponotus herculeanus</i> ,
<i>Lasius umbratus</i> ,	<i>Camponotus marginatus</i> .
<i>Lasius niger</i> ,	

In the majority of cases the subspecies or varieties which represent these species in Japan are much more closely related to the European types than to the North American subspecies and varieties.

The following list embraces forms which are known only from Japan, though in many cases these have pronounced affinities with other palearctic species, subspecies and varieties:

<i>Sysphincta watasei</i> ,	<i>Ponera japonica</i> ,
<i>Ectomyrmex japonica</i> ,	<i>Myrmecina nipponica</i> ,
<i>Pseudoponera sauteri</i> ,	<i>Pheidole nodus</i> ,
<i>Brachyponera solitaria</i> ,	<i>Pheidole ferrida</i> ,

<i>Messor aciculatus</i> ,	<i>Iridomyrmex itoi</i> ,
<i>Leptothorax congruus</i> ,	<i>Iridomyrmex abbotti</i> ,
<i>Leptothorax spinosior</i> ,	<i>Technomyrmex gibbosus</i> ,
<i>Pristomyrmex japonicus</i> ,	<i>Prenolepis flavipes</i> ,
<i>Monomorium nipponense</i> ,	<i>Formica yessensis</i> ,
<i>Monomorium triviale</i> ,	<i>Formica fusciceps</i> ,
<i>Cremastogaster laboriosa</i> ,	<i>Formica nipponensis</i> ,
<i>Cremastogaster osakensis</i> ,	<i>Camponotus obscuripes</i> ,
<i>Stenamma owstoni</i> ,	<i>Camponotus vitiosus</i> ,
<i>Vollenhovia emeryi</i> ,	<i>Camponotus 4-notatus</i> ,
<i>Aphænogaster famelica</i> ,	<i>Camponotus brunni</i> .

Perhaps the most interesting of the new forms described in the following pages are *Sysphincta watasei*, *Myrmecina nipponica*, *Stenamma owstoni*, and *Vollenhovia emeryi*. These forms, with the exception of the last, have decidedly palearctic and nearctic affinities.

In working over the materials for the following revision of the Japanese ants I have been greatly aided by Professor Emery, who has taken the trouble to compare several of my specimens with the types of allied species in his extensive collection and has generously given me his expert opinion on the status of some of the new forms.

FAMILY FORMICIDÆ.

Subfamily Ponerinæ.

1. *Sysphincta watasei*, sp. nov.

Worker (Plate XLI, Fig. 5). Length 4 mm.

Mandibles with oblique blades, 5-6-toothed; the three basal teeth blunt. Head, excluding the mandibles, longer than broad, with rounded posterior angles. Cheek with a short carina anteriorly. Eyes very small, near the middle of the lateral surface. Clypeus very short, its compressed middle portion projecting in front as a prominent blunt tooth between the high and approximated frontal carinæ. Antennal scapes thickened towards their tips and somewhat curved, reaching to the posterior corners of the head; joints 1-10 of the funiculus about as long as broad, terminal joint barely as long as the three preceding joints together. Thorax in profile convex in front, flattened behind, laterally compressed, much broader in front than behind. Epinotum with two indistinct teeth above, connected by a transverse ridge and each continued down on the side as a ridge bordering the concave epinotal declivity. Petiole from above longer than broad, broader behind than in front; in profile with a convex rounded node above, and below near its middle with a sharp tooth. Postpetiole campanulate, twice as broad as the petiole, not longer than broad; in profile flattened above, especially in front. First gastric segment somewhat broader and twice as long as the postpetiole, convex above; remaining gastric

segments prominent, forming a cone which is bent forward and has a base occupying the posterior $\frac{3}{4}$ of the ventral surface of the first gastric segment. Sting well developed. Legs rather long and robust.

Mandibles, appendages and body opaque, with the exception of the gaster which is shining. Mandibles finely striated. Head, thorax and pedicel densely punctate or granular, the surface becoming more uneven on the epinotum, petiole and postpetiole. Upper surface of postpetiole almost rugulose. Gaster very finely punctate.

Body and appendages covered with rather long yellowish pubescence, interspersed with longer, suberect hairs of the same color.

Rich ferruginous red, gaster somewhat paler, mandibular teeth, edges of clypeus and frontal carinae blackish.

Female (dealtated). Length 4.8 mm.

Resembling the worker except in the usual sexual characters, namely, the presence of the ocelli, the larger eyes and the structure of the thorax. The wing insertions and thoracic sutures are black. The ventral tooth of the petiole is in the middle of the segment as in the worker. The first gastric segment is distinctly broader than the postpetiole.

Described from single worker and female specimens collected by Mr. H. Sauter, the former at Okayama, Bizen, the latter at Kamakaur on the Sagami Gulf "under drift-wood on the sea-beach." This species, which I take pleasure in dedicating to my old friend Professor Sho Watasê of the Imperial University at Tokio, very closely resembles the other known species of the genus, namely the three Mediterranean species *S. europæa*, *algerica*, and *mayri*, and the two North American species *melina* and *pergandei*. The Japanese species may be distinguished from all of these except *S. algerica* by its flatter postpetiole, from *algerica* by the position of the ventral petiolar tooth, which is in the middle and not at the anterior end of the segment.

2. *Pachycondyla* (*Ectomomyrmex*) *japonica* Emery.

EMERY, Rendic. R. Accad. Sci. Ist. Bologna, Ann. 1901, p. 12 (sep.) 1, ♀

This ant, of which I have seen no specimens, was described from the Island of Tsushima, between Japan and Corea.

3. *Pachycondyla* (*Pseudoponera*) *sauteri* sp. nov.

PLATE XLI, FIG. 66, a.

Worker. Length 3-3.5 mm.

Head longer than broad, narrower in front than behind, with straight posterior border. Eyes very small, of one or two ommatidia, situated about $\frac{1}{4}$ the distance from the anterior to the posterior corner. Mandibles broad, triangular, 7-8-toothed, with rather straight outer borders. Clypeus short,

its anterior border nearly straight, its middle portion projecting between the carinae as a small rounded protuberance. Frontal groove distinct, extending back beyond the middle of the head. Antennal scapes incrassated at their tips and not reaching the posterior corners of the head by a distance equal to twice their greatest diameter. First funicular joint nearly as long as the three preceding joints taken together; second joint as long as broad, joints 3-7 distinctly broader than long; joints 8-10 as broad as long; terminal joint nearly as long as the three preceding joints and forming with them a 4-jointed club, which is much thicker than the basal portion of the funiculus. Thorax with pronounced promesonotal and mesoepinotal sutures; pronotum somewhat narrower than the head, rounder in front and on the sides, nearly twice as broad as long; mesonotum shorter and narrower than the pronotum, slightly convex; epinotum as long as the pronotum, but only half as broad, laterally compressed, its basal surface in profile straight, slightly lower than the mesonotum, distinctly longer than the declivity which is abrupt and has rounded lateral edges. Petiole from above as broad as the epinotum, somewhat broader than long, broader behind than in front; in profile a little higher than the epinotum, narrower above than below, with flattened and vertical anterior, truncated upper, and somewhat convex posterior, surfaces. Constriction between the first and second gastric segments rather indistinct. Legs stout; those of the middle and hind pairs, each with a pectinated and a simple spur; middle tibia and metatarsus bristly on their extensor surfaces, the latter joint much shorter than the hind metatarsus.

Clypeus and mandibles very smooth and shining, the latter sparsely and coarsely punctate. Head opaque, densely and finely punctate, frontal groove shining. Thorax, abdomen and appendages subopaque or in some specimens shining, more sparsely punctate than the head.

Body and appendages covered with yellow pubescence and suberect hairs of the same color, which are most conspicuous on the gaster and legs.

Mandibular teeth black, remainder of the body uniformly ochraceous.

Female, Length 4 mm.

Differs from the worker in color, the upper surface of the head, except its anterior third, the petiole and gaster dark brown or blackish. In some specimens this color extends over the sides of the mesonotum and the upper surface of the pronotum. Wings opaque, distinctly and uniformly infuscated.

Described from a number of workers and females (mostly dealated) taken by Mr. Hans Sauter, March 25, '05 at Yamanaka, Suruga ("1700 ft.; under stones"), and April 15, '05 at Takakiyama, near Kanagawa on the Sagami Gulf.

This species is closely allied to the palearctic *P. ochracea* Mayr, of which Professor Emery has sent me a worker and a female specimen. The Japanese species is darker in color and has a shorter head, which is broader behind with its sides converging anteriorly and thicker antennæ with more club-shaped funiculi.

4. *Euponera* (*Brachyponera*) *solitaria* F. Smith.

PLATE XLI, FIG. 13.

Ponera solitaria F. SMITH, Trans. Ent. Soc. London, 1874, p. 404, ♀*Ponera solitaria* MAYR, Verh. zool. bot. Ges. Wien. XXXVI, 1886, p. 363.*Ponera solitaria* FOREL, Bull. Soc. Ent. Suisse, X. 7, 1900, p. 267 and 284,

♀ ♀

Euponera (*Brachyponera*) *solitaria* EMERY, Ann. Soc. Ent. Belg., XLV, 1901, p. 47.

Several workers and dealated females collected by Mr. Hans Sauter during March and April 1905, at Kanagawa near Yokohama. Forel's specimens of the workers and females arrived in Hamburg in a living condition with plants (*Prunus*) imported from Japan. As Forel has shown, this species is allied to the two Indian species, *luteipes* Mayr and *jerdoni* Forel. It differs from both of these in having the posterior border of the head less deeply excised.

5. *Ponera japonica* sp. nov.*Worker.* Length 2-2.25 mm.

Mandibles with three larger apical, and numerous minute basal teeth. Head excluding the mandibles, fully $1\frac{1}{2}$ times as long as broad, nearly as broad in front as behind, with subparallel sides; occipital border slightly concave. Antennal scapes not reaching the posterior corners of the head by a distance equal to their greatest transverse diameter. All the funicular joints, except the first and last, distinctly broader than long; basal joints very short and narrow, four terminal joints forming a thickened club, which is distinctly longer than the remainder of the funiculus. Last joint about as long as the three preceding subequal joints. Eyes minute, consisting of only a few ommatidia and situated about $\frac{1}{2}$ the distance from the anterior to the posterior border of the head. Thorax from above much broader in front than behind, in profile with straight dorsal surface and distinct promesonotal and meso-epinotal sutures. There is also a distinct suture between the mesonotum and mesopleuræ. Mesonotum about $\frac{1}{2}$ as long as the pronotum; basal surface of epinotum about as long as the declivity, which is distinctly flattened but hardly marginate on its sides. Petiole thick, nearly as long as broad, from above broader behind than the epinotum; in profile as high as the epinotum and gaster, flattened in front and behind and above, laterally compressed below and armed with a small median ventral tooth. Gaster and legs of the usual shape.

Head subopaque, very finely and densely punctate, thorax and abdomen more shining, more sparsely and more finely punctate.

Pubescence and hairs grayish yellow, longest and most conspicuous on the upper surfaces of the head, thorax, and gaster.

Reddish brown; upper surface of body dark brown; mandibles, clypeus, frontal carinæ, antennæ, and legs yellow.

Female. Length 2.7 mm.

Resembling the worker, but the body is darker in color and the petiole is proportionally shorter, with flatter anterior and posterior surfaces. The upper surface of the thorax is almost as coarsely punctate as the head but more sparsely. The basal surface of the epinotum is only about half as long as the declivity.

Described from two dealated females and several workers taken by Mr. Hans Sauter at Yamanaka, Suruga, on the western slope of the Hakone Mountains.

This species is closely related to the palearctic and nearctic *P. coarctata* Latr., but differs in its smaller size, thicker petiolar node, and shorter antennæ. The scapes do not reach so far back on the head, and the funiculus has much shorter basal and more club-shaped terminal joints. The sculpture and pilosity closely resemble those of *coarctata*.

Subfamily MYRMICINÆ.

6. *Myrmecina graminicola nipponica* subsp. nov.

The worker of this subspecies, like that of the typical European form, has well-developed median and lateral clypeal teeth, and the two pairs of teeth on the epinotum are similar, except that the posterior pair are somewhat broader and blunter in the Japanese specimens. The sculpture of the head, thorax and pedicel is much more pronounced than in the European and North American forms. It consists of coarse longitudinal, more or less anastomosing rugæ, especially on the head and thorax. Pilosity and color as in the European type. Length 3 mm.

Two workers collected by Mr. Hans Sauter at Yamanaka, Suruga.

7. *Solenopsis fugax* Latreille.

This well-known European species is cited by Ernest André as occurring in Japan. (Bull. Mus. d'Hist. Nat. Paris, 1903, p. 128, ♂)

8. *Pheidole nodus* F. Smith.

Pheidole nodus F. SMITH, Trans. Ent. Soc. London, 1874, p. 407, ♀

Pheidole nodus MAYR, Verhandl. zool. bot. Ges. Wien, XXXVI, 1886, p. 363.

Pheidole nodus FOREL, Bull. Soc. Ent. Suisse, X, 7, 1900, p. 268, ♀ ♀

Soldier (Plate XLI, Fig. 8). Length 4-4.5 mm.

Allied to *Ph. striativentris* Mayr of India. Mandibles convex, flattened on the outer surface towards the base, with two apical teeth and a small basal tooth. Head, excluding the mandibles, but little longer than broad, somewhat narrower in front than behind; posterior angles rather acute, posterior border broadly excised, median dorsal surface convex. Eyes one third the distance

from the anterior to the posterior corner, convex. Clypeus short, very flat or slightly concave in the middle, with a deep median notch in the anterior border and a distinct median keel. Frontal area carinate in the middle, concave, fused with the clypeus. Frontal carinae low, but very long and diverging, extending to within a short distance of the posterior corners of the head and forming shallow scrobes as long as the antennal scapes. Antennae slender; scape curved at the base, very slightly enlarged towards its tip, which reaches half way between the eye and the posterior corner of the head; funicular joints 1-8 a little longer than broad; three terminal joints subequal, slender, together longer than the remainder of the funiculus. Thorax less than half as broad as the head, hardly broader through the pro- than through the epinotum, constricted in the mesothoracic region; pronotum rounded on the sides but with distinct humeri. There is a well-marked transverse depression across the posterior pronotal surface and also a distinct promesonotal depression. Epinotum with two sharp spines directed upward and outward, twice as far apart as long and longer than broad at their bases. The basal and declivous surfaces of the epinotum form almost a continuous sloping surface between the spines. Petiole barely half as broad as the epinotum, $1\frac{1}{2}$ times as long as broad and distinctly broader in front than behind, with sides slightly concave in the middle; node transverse, in profile high and rather acute, with long concave anterior, and short concave posterior slope. Postpetiole more than three times as broad as the petiole, about $1\frac{1}{2}$ times as long as broad, with very convex and much rounded dorsal surface and the sides produced in the middle as blunt angles. Gaster about twice as broad as the postpetiole, much smaller than the head. Legs rather long and slender.

Mandibles smooth and shining, with coarse, scattered punctures; on the outer surface near the base with coarse longitudinal rugae. Clypeus shining, longitudinally rugose on the sides. Head subopaque, coarsely, longitudinally and reticulately rugose throughout. Even the antennal scrobes are crossed by rugae. Between the rugae the surface is finely punctate. Pronotum and base of epinotum transversely rugose, the latter more delicately, the remaining surface more irregularly; epinotal declivity and petiole smooth and shining; postpetiole finely reticulate; summit of the node with delicate transverse rugae. Gaster smooth and shining, except the basal fourth or third of the first segment, which is sharply longitudinally rugose. Legs shining, coarsely and sparsely punctate.

Body with coarse, yellow, erect hairs, which are especially long and conspicuous on the head, thorax, pedicel and gaster. There are similar but much more reclinate hairs on the legs, antennae and mandibles.

Ferruginous brown; head and gaster darker, the latter sometimes paler at the base. Legs, and in some specimens also the thorax and pedicel, yellow. Edges of mandibles and anterior border of clypeus black.

Worker. (Plate XLI, Fig. 9). Length 2.3-2.5 mm.

Mandibles slender, with two prominent apical and several minute basal teeth. Head, excluding the mandibles, but little longer than broad, elliptical, without posterior corners. Eyes prominent and convex, in front of the middle of the head. Clypeus convex, with a median keel and an entire, broadly rounded anterior border. Frontal carinae rather short, high and far apart.

Frontal area depressed, triangular, not fused with the clypeus. Antennæ very slender, scapes, when turned directly back, extending about $\frac{1}{2}$ their length beyond the head; all the funicular joints longer than broad; three terminal joints subequal, very long and slender. Thorax resembling that of the soldier, but with rounder and more sloping humeri and no transverse depression on the posterior portion of the pronotum. Mesonotal depression deep and rounded at the bottom. Basal epinotal surface convex, especially in front; spines short, hardly longer than broad at their bases. Petiole like that of the soldier but with a more conical node; postpetiole three times as broad as the petiole, slightly longer than broad, convex above, pyriform, broader behind than in front. Gaster about the size of the head, with a rather straight anterior border. Legs slender.

Smooth and shining; cheeks and front with a few longitudinal rugæ. Meso- and metapleuræ reticulate-rugose, subopaque.

Hairs white or pale yellow, erect or suberect, sparse on the body, more abundant on the legs and antennæ.

Brownish yellow, head and gaster somewhat darker; teeth of mandibles black.

Female (deâlated). Length 5.5-6 mm.

Head resembling that of the soldier. Thorax somewhat narrower than the head, longer than broad, with very flat mesonotum and scutellum. Epinotal spines robust, blunt, longer than broad at their bases, more than twice as far apart as long, directed backward and outward and very slightly upward. Petiole from above similar to that of the soldier, broader in front than behind, with sharp anterior corners and straight sides; node much compressed antero-posteriorly so that its summit is a sharp blade, deeply notched in the middle. In profile the anterior slope is long and straight, the posterior short and abrupt. Below, the petiole is produced in the middle into a compressed keel, gradually increasing in height posteriorly. Postpetiole about $2\frac{1}{2}$ times as broad as the petiole, straight and broadest in front, semicircular behind, so that its sides appear to be produced anteriorly as blunt or somewhat truncated projections. In profile the node is high and evenly rounded. Gaster broad and flat.

The sculpture of the head is like that of the soldier. Pro- and mesonotum, paraptera, scutellum and sides of thorax with regular longitudinal rugæ; base of scutellum smooth and shining; petiole and epinotal declivity shining and obscurely punctate-rugulose. Postpetiole subopaque, node transversely rugose. Gaster shining except the basal half of the first segment, which is opaque and covered with regular longitudinal striæ.

Pilosity like that of the soldier.

Deep reddish brown; legs, antennal funiculi and epinotal declivity more yellowish.

Described from several females, soldiers and workers taken by Mr. Hans Sauter from colonies nesting under stones near Okayama, Bizen. The types from Hiogo were very inadequately described by Smith. According to Forel, who received soldiers and workers from Osaka, this species is very closely related to the Indian *Ph. rhombinoda* Mayr,

"but the head of the soldier is more elongated, the antennal scrobe shallower, the thorax smoother, the epinotal spines more slender and pointed. In the worker the epinotum is shorter."

9. *Pheidole fervida* F. Smith.

Pheidole fervida F. SMITH, Trans. Ent. Soc. London, 1874, p. 406, 407, ♀

Pheidole fervida MAYR, Verhandl. zool. bot. Ges. Wien, XXXVI, 1886, p. 363.

Pheidole fervida FOREL, Bull. Soc. Ent. Suisse, X, 7, 1900, pp. 268 and 285, ♀

A single soldier and six workers taken by Mr. Hans Sauter at Yamanaka, Suruga, and four workers taken by him at Kanagawa, near Yokohama, seem to belong to this species, which was very inadequately described by Smith. As Forel says, it closely resembles *Ph. megacephala*, but the head of the soldier has a faint scrobe for the antennal scape, which is shorter than that of *megacephala*, and the rugæ extend further back. More material of this form is necessary before the status of *Ph. fervida* can be accurately determined. According to Forel living specimens have been imported into Hamburg in bamboo plants.

10. *Monomorium floricola* Jerdon.

Monomorium intrudens F. SMITH, Trans. Ent. Soc. London, 1874, p. 406, ♀

Monomorium intrudens MAYR, Verhandl. zool. bot. Ges. Wien, XXXVI, 1886, p. 363.

F. Smith's *M. intrudens* may be regarded as a synonym of the well-known tropicopolitan *M. floricola* on the authority of Prof. Emery (*in litteris*) who remarks that Smith's description "agrees in every point" with specimens of the latter species.

11. *Monomorium nipponense* sp. nov.

Worker. Length 1.3 mm.

Head longer than broad, oblong, with parallel sides and straight posterior border. Eyes small, distinctly in front of the middle of the head. Clypeus and frontal area convex, the former with broadly rounded anterior margin. Antennæ 12-jointed, scapes not reaching to the posterior corners of the head; first funicular joint about twice as long as broad, joints 2-8 very small, much broader than long, joints 9 and 10 subequal, as long as broad, together decidedly shorter than the terminal joint. Prothorax half as broad as the head, pro- and mesonotum evenly rounded, hemispherical, separated by a sharp but not very deep constriction from the epinotum which is also evenly rounded and sloping, without any angle between the base and declivity. Petiole barely twice as long as broad, pedunculate in front, broader behind; node in profile high but

evenly rounded. Postpetiole no broader than the petiole; globular, but little broader than long; in profile lower than the petiole. Gaster flattened, somewhat larger than the head.

Body smooth and shining throughout.

Hairs yellow, very sparse, erect on the upper surface of the body, delicate and appressed on the antennæ and legs.

Pale yellow; gaster black with a small yellow spot, the size of the postpetiole, at its extreme base.

Described from seven workers taken by Mr. Hans Sauter at Kanagawa near Yokohama. *M. nipponense* is allied to *M. destructor* but differs in its smaller size, much more compact antennæ, shorter and stouter pedicel, proportionally smaller head, etc.

12. *Monomorium triviale* sp. nov.

Worker. Length 1.3-1.5 mm.

Head nearly $1\frac{1}{2}$ times as long as broad, rectangular; occipital border feebly excised. Clypeus broadly rounded in front. Eyes in front of the middle of the head. Antennæ 12-jointed; tip of scape reaching about half-way between the eye and the posterior corner of the head; joints 2-8 of the funiculus narrower than the elongated first joint, much broader than long; two basal joints of club subequal, much narrower than the terminal joint and together hardly half as long. Thorax rather slender, anteriorly about half as broad as the head; mesoëpinotal constriction distinct but shallow; epinotum small, rounded, without any angle between the basal and declivous surfaces. Petiole hardly half as broad as the epinotum, nearly twice as long as broad, distinctly pedunculate in front; node in profile high with longer concave anterior and shorter convex posterior slopes. Postpetiole hardly broader than the petiole, a little broader than long, in profile much smaller and lower than the petiole, evenly rounded above. Gaster somewhat smaller than the head. Legs slender.

Surface of body smooth and shining throughout.

Hairs yellow, sparse and erect on the head, thorax and abdomen; shorter and more appressed on the appendages.

Pale yellow throughout; mandibular teeth brownish.

Described from seven workers taken by Mr. Hans Sauter at Kanagawa on a "heath on the margin of a pond."

At first sight this species appears to agree with the Indian *M. atomus* Forel, with which I at first identified it, but Prof. Emery, who has compared some of my specimens with one of Forel's types, writes me that the Japanese insect is smaller, has a narrower head, and shorter antennæ, the scape not reaching so far back and the funiculus being more slender than in *atomus*.

13. ***Cremastogaster sordidula* Nylander var. *osakensis* Forel.**

FOREL, Bull. Soc. Ent. Suisse, X, 7, 1900, p. 269, ♀

Several workers collected by Mr. Hans Sauter at Kanagawa agree with Forel's description of this yellow form of the palearctic *sordidula*. The types are from Osaka, as the name indicates.

14. ***Cremastogaster laboriosa* F. Smith.**

F. SMITH, Trans. Ent. Soc. London, 1874, p. 407, ♀

The types of this inadequately described species are from Hiogo.

15. ***Cremastogaster laboriosa* F. Smith var. *matsumurai* Forel.**

(PLATE XLI, FIG. 1.)

FOREL, Ann. Soc. Ent. Belg., XLV, 1901, p. 372, ♀

Described by Forel from Sapporo in the island of Yezo. It seemed certain to him that his specimens, coming from a locality so far from Hiogo, must represent a distinct variety. I find however that a number of workers collected by Hans Sauter at Kanagawa and Yamanaka agree perfectly with Forel's description of the variety *matsumurai* though these localities are in southern Japan near Hiogo. It is probable, therefore, that the characters which Forel regards as varietal are merely omitted in Smith's brief and slipshod description.

A dealated female from Yamanaka, Suruga, is 6 mm. long, dark brown, with yellowish mandibles, legs and antennæ. Body smooth and shining, very sparsely and finely punctate; anterior half of head subopaque, finely and longitudinally striated. Head broader than long. Epinotal spines very short, stout and blunt. Petiole and postpetiole similar to those of the worker, the latter segment with a faint median depression.

According to a note accompanying the specimens, this ant lives "in small colonies under the bark of pines and *Cryptomerias*."

16. ***Vollenhovia emeryi* sp. nov.**

Worker. (Plate XLI, Figs. 10 and 11.) Length 2-2.3 mm.

Head longer than broad, rectangular, with straight, subparallel sides and broadly concave posterior border. Eyes rather large, in front of the middle of the head. Mandibles with 5 graduated teeth. Clypeus short, with transverse anterior border, not produced in the middle, and with two longitudinal, rather thick ridges, diverging anteriorly and separated by a depression. Antennæ 12-jointed; scape short, swollen distally, its tip reaching half the distance

between the eye and the posterior corner of the head. Funiculus exceeding the length of the scape by the length of the terminal joint; the three terminal joints forming a distinct club; first funicular joint as long as joints 2-5 together; joints 2-8 broader than long; 9th joint half as long as the 10th, 10th less than half as long as the terminal joint. Prothorax broad in front but distinctly narrower than the head, sides of meso- and epinotum compressed. Dorsal surface of thorax flattened, with a very faint mesoëpinotal depression. Epinotum as high as the mesonotum, with long slanting basal, and much shorter, concave declivous surface and bearing two small teeth widely separated at their bases. Petiole from above $1\frac{1}{2}$ times as long as broad, subrectangular, with sides slightly convex, in profile triangular, with a pointed node, the anterior and posterior declivities of which are subequal, the former slightly concave, the latter nearly straight. The petiole is compressed below and carinate and terminating in a large blunt tooth anteriorly. Postpetiole from above about as long as broad, slightly broader behind than in front, in profile hemispherical above, flattened and toothless below. Gaster long and narrow without basal angles, somewhat flattened dorsoventrally. Legs rather short, femora and tibiæ distinctly thickened.

Mandibles, clypeus, and frontal area shining, the first with scattered punctures. Head subopaque, covered with longitudinal rows of large umbilicate, piligerous punctures or foveolæ, except in the middle where there is a narrow, smooth, shining streak running from the frontal area nearly to the occiput. Thorax and petiole subopaque, pronotum longitudinally rugose and umbilicately punctate; epinotum densely punctate or granular; upper surface of petiole and postpetiole similar to that of the pronotum, the middle of the latter smooth and shining. Gaster and legs shining, with scattered, coarse, piligerous punctures.

Whole body, including legs and antennæ, covered with pale yellow, suberect or reclinate hairs.

Reddish brown; a large elongate spot on the front; the epinotum, upper surface of postpetiole, sides and posterior dorsal surface of gaster blackened. Mandibles, clypeus, antennæ and legs brownish yellow.

Female. Length 3 mm.

Resembling the worker. Mesonotum and scutellum each with a large elongate shining area in the middle, the former also with a shining spot over each parapsis. Postpetiole less shining above in the middle than in the worker. Gaster with large and more numerous piligerous punctures. Wings gray, densely pilose, with brown stigma and veins.

Described from several workers and two females taken by Mr. Hans Sauter at Negishi near Yokohama (Feb. 25, 1905) and numerous workers taken at Yamanaka and Kanagawa. The specimens taken in Kanagawa are marked as taken on a heath.

This species of *Vollenhovia* differs from its Indian and Malayan congeners in its peculiar sculpture and in having a distinctly armed epinotum. In size and general appearance it approaches *V. subtilis* Emery from Papua, but this species has a shining, unarmed epinotum and smoother petiole and postpetiole.

17. *Stenamamma owstoni* sp. nov.

Worker. Length 3.25-3.5 mm.

Head, excluding the mandibles longer than broad, sides rather straight, subparallel, posterior corners rounded. Clypeus short, depressed, its anterior border emarginate in the middle, behind fused with the deeply impressed frontal area. Frontal carinae short, but prominent. Eyes moderate, with 7-8 ommatidia in the longitudinal diameter. Antennal scapes reaching to the posterior corners of the head. Funiculus with a 4-jointed club, first joint twice as long as broad, joints 2-4 nearly as long as broad, 5-7 as long as broad, joints 8-10 slightly longer than broad, terminal joint as long as the two preceding joints together. Thorax with the pro- and mesonotum rather convex, higher than the epinotum and separated from it by a pronounced constriction. Basal epinotal surface in profile straight, longer than the concave declivity; spines small, a little longer than their distance apart at the base, directed upward and backward. Petiole narrow, $3\frac{1}{2}$ times as long as broad, seen from above gradually widening posteriorly, in profile unarmed below, with a very low, rounded node above. Postpetiole $1\frac{1}{2}$ times as broad as the petiole, nearly twice as long as broad, regularly elliptical from above, in profile with a low, regularly rounded node and a slightly concave ventral surface.

Mandibles subopaque, rather coarsely striatopunctate, clypeus and frontal area smooth and shining, head and thorax subopaque, the former rather finely, the latter more coarsely, longitudinally reticulate-rugose. Epinotal declivity smooth and shining. Petiole punctate-rugulose, opaque, except the upper surface of the node which is smooth and somewhat shining. Postpetiole and gaster smooth and shining, the former more opaque and rugose on the sides and below. Legs and antennae subopaque.

Body and appendages covered with abundant, suberect whitish hairs, which are longest on the gaster.

Reddish brown; head and first gastric segment blackish. Mandibles, clypeus, antennae and legs, posterior border of first gastric segment and all the remaining segments yellowish.

Described from three specimens collected by Mr. Hans Sauter, at Yamanaka, Suruga, at an altitude of 2000 ft. "in rotten wood." The three specimens appear to have been taken from as many different colonies.

This species is closely related to the European *S. westwoodi* Westw. and the North American *brevicorne* Mayr. From the former it differs in having much larger eyes, longer joints in the base of the antennal funiculus, a lower, less angular and smoother petiolar node, a longer postpetiole and longer and more abundant hairs. From the North American species it differs in these same characters, except that the eyes are of about the same size and the sculpture distinctly finer.

18. *Stenamma (Aphænogaster) famelicum* F. Smith.

Ischnomyrmex famelicus F. SMITH, Trans. Ent. Soc. London, 1874, p. 405, ♀

Aphænogaster famelica MAYR, Verhandl. zool. bot. Ges. Wien, Jahrg. 1878, pp. 669, 670, ♀

Aphænogaster famelica FOREL, Bull. Soc. Ent. Suisse, X, 7, 1900, pp. 267, 268, ♀

Aphænogaster famelica FOREL, Mitth. naturhist. Mus. Hamb., XVIII, 1901, p. 61.

Of this species, originally described from Hiogo, I find no specimens among my material. Forel records it from Hozuyama, Majori Tamba. The species has been redescribed by Mayr who calls attention to its close resemblance to the nearctic *S. (A.) fulvum* Roger and the palearctic *striola* Roger.

19. *Stenamma (Messor) aciculatum* F. Smith.

Aphænogaster aciculata F. SMITH, Trans. Ent. Soc. London, 1874, p. 405, ♀ ♀

Aphænogaster aciculata MAYR, Verhandl. zool. bot. Ges. Wien, 1878, p. 670.

According to Mayr, who examined one of Smith's type specimens, this species is probably the same as *Aphænogaster obsidiana*. See the following variety.

20. *Stenamma (Messor) aciculatum* F. Smith var. *brunneicorne* Forel.

(PLATE XLI, Fig. 14.)

FOREL, Mittheil. naturhist. Mus. Hamburg, XVIII, 1901, pp. 60, 61, ♀

Forel described this form, which he somewhat doubtfully referred to Smith's *A. aciculata*, from Hozuyama, Kuwadagori Tamba. Among my material I find three workers taken from as many colonies at Takakiyama near Kanagawa by Mr. Hans Sauter. They agree very well with Forel's description, except that all the funicular joints are longer than broad, a character which brings them closer to the well-known *S. (M.) barbarum*. Forel notes the resemblance of the Japanese form to *S. barbarum* var. *rugosum*. It is not improbable that more material may lead us to change the name of the form to *S. (M.) barbarum* var. *aciculatum*.

21. *Myrmica rubra lævinodis* Nylander.

Forel (Ann. Soc. Ent. Belg., XLV, 1901, p. 371) mentions a female of this subspecies from Sapporo, Yezo, as being "absolument typique."

22. *Myrmica rubra lobicornis* Nylander var. *jessensis* Forel.

FOREL, Ann. Soc. Ent. Belg., XLV, 1901, p. 371, ♀

According to Forel, the worker of this variety has "the antennal lobe a little shorter than the type, the epinotal spines shorter and the petiolar node more rounded, almost as in the var. *schencki* Emery, so that I cannot decide, notwithstanding the characters of the male, to assign it to *scabrinodis*. It has the deep color of the *lobicornis* of the northern Alps. Its antennal lobe is much more developed than in the variety *fracticornis* Emery of the United States."

It is a significant fact that none of the forms of the circumpolar *M. rubra* are represented in Mr. Sauter's collections from southern Japan.

23. *Leptothorax congruus* F. Smith.

F. SMITH, Trans. Ent. Soc. London, 1874, p. 406, ♀

Worker. Length 2-2.5 mm.

Head, excluding the mandibles, longer than broad, with slightly convex sides and straight posterior margin. Eyes a little in front of the middle. Clypeus convex with nearly straight anterior border, without a median depression or emargination. Antennæ 12-jointed; tip of scape not reaching the posterior corner of the head by a distance equal to its transverse diameter; first funicular joint 3 times as long as broad, joints 2-8 distinctly broader than long, subequal, joints 9-11 forming a club, the terminal joint of which is as long as the two preceding subequal joints together. Thorax in front nearly two-thirds as broad as the head, with rounded and sloping humeri, in profile straight above, with barely indicated mesoepinotal constriction. Epinotal spines short, acute, about a third the length of the straight basal surface, a little further apart at their bases than long, directed outward, backward and a little upward. Petiole from above nearly half as broad as the epinotum, more than twice as long as broad, gradually widening anteriorly; in profile with a well developed node, whose anterior slope is slightly concave and hardly longer than the convex posterior slope. Postpetiole from above $1\frac{1}{2}$ times as broad as the petiole, a little broader than long, rectangular, in profile convex dorsally, especially in front. Gaster flattened dorsoventrally, with straight anterior border. Legs rather robust, femora incrassated in the middle.

Mandibles coarsely striato-punctate. Clypeus longitudinally rugose, smoother and more shining in the middle. Head, thorax and pedicel subopaque; head rather finely and longitudinally rugose-punctate; thorax irregularly and coarsely rugose on the dorsal surface, pleuræ and epinotum more finely and reticulately rugose, as are also the petiole and postpetiole. Gaster smooth and shining.

Hairs white, obtuse, erect and rather short on the trunk; delicate, tapering and appressed on the appendages.

Dark brown; head and gaster nearly black; mandibles, legs and antennæ yellowish brown; antennal scapes and clubs, middle portions of femora and tibiæ darker and in some specimens almost black

Female (deålated). Length 3-3.75 mm.

Resembling the worker. The thorax is robust, flattened and rather shining above; the mesonotum and scutellum regularly longitudinally rugose, the latter smoother behind. Epinotum and pedicel opaque, very coarsely rugose; epinotal spines short and blunt. Color like that of the worker except that the thorax is almost black.

Described from three females and numerous workers collected by Mr. Hans Sauter at Takakiyama, Kanagawa and Yamanaka, Suruga. F. Smith's types of this species were from Hiogo.

24. *Leptothorax congruus* F. Smith var. *spinosior* Forel.

FOREL, Ann. Soc. Ent. Belg., XLV, 1901, p. 371, ♀

According to Forel this variety, of which he obtained specimens from Sapporo, Yezo, has the epinotal spines "long and curved inward, as long as the basal epinotal surface and longer than their interval, reddish at their tips." Four workers and a deålated female collected by Hans Sauter at Yamanaka at an altitude of 900 ft. agree with Forel's description. They are all smaller and much paler in coloration than the corresponding phases of the typical *congruus* above described. The epinotal spines diverge but are bent downwards at their tips. Forel calls attention to the similarity of this variety to the European *L. tuborum* Fabr.

25. *Tetramorium cæspitum* Linn.

Forel (Bull. Soc. Ent. Suisse, X, 7, 1900, p. 268) mentions two varieties of this common European ant from Osaka, "one paler and smaller, the other black and larger." Among my specimens two workers collected by Professor J. F. Abbott near the Marine Biological Laboratory at Misaki belong to the large, dark form. Six others collected by Mr. Hans Sauter at Kanagawa are decidedly smaller but of the same dark color.

26. *Pristomyrmex japonicus* Forel.

(PLATE XLI, Fig. 7.)

FOREL, Bull. Soc. Ent. Suisse, X, 7, 1900, pp. 268, 269, ♀

FOREL, Ann. Soc. Ent. Belg., XLV, 1901, p. 371.

The types of this species are from Osaka, but Forel mentions its occurrence also at Sapporo, Yezo. Twelve workers collected by Professor J. F. Abbott near the Marine Biological Laboratory at

Misaki agree well with Forel's description. The long epinotal spines are distinctly divergent and the funicular joints 2-7 are broader than long. These characters serve to distinguish the species from the closely allied *P. pungens* Mayr of Ceylon and Malacca.

27. *Strumigenys godeffroyi* Mayr var. *lewisi* Cameron.

Strumigenys lewisi CAMERON, Proceed. Manchester Lit. Phil. Soc., XXV, 1886, pp. 229, 230, ♀ ♀

Strumigenys godeffroyi MAYR var. *lewisi* MAYR, Verhandl. zool. bot. Ges. Wien, XXXVII, 1887, p. 569, *nota*, ♀ ♀

Strumigenys godeffroyi MAYR var. *lewisi* MAYR, Termeszérajzi Füzetek, XX, 1897, pp. 431, 432 (pseudogyne?).

Strumigenys godeffroyi var. *lewisi* FOREL, Journ. Bombay Nat. Hist. Soc., XIV, 1902, p. 707.

Strumigenys lewisi BINGHAM, Fauna Brit. India, Hymenopt, II, 1903, p. 149, ♀

This ant (Plate XLI, Fig. 12), which is known to occur also in Burma and Ceylon, was originally described by Cameron from Nagasaki. Later Mayr showed that it is hardly more than a variety of the Samoan *S. godeffroyi*, from which it differs in having curved instead of straight mandibular blades. I have before me a number of workers and a few dealated females collected by Mr. Hans Sauter in the following localities: Negishi, Kanagawa and Yamanaka (1700 ft.). According to a note accompanying the specimens they were taken "in siftings in pine woods."

Subfamily DOLICHODERINÆ.

28. *Iridomyrmex itoi* Forel.

FOREL, Bull. Soc. Ent. Suisse, X, 7, 1900, p. 269, ♀

I have not seen the typical form of this species, which is allied to the Australian and Indian *I. glaber* Mayr. It differs mainly in the structure of the epinotum, the basal surface of which "is much longer than in *glaber*, nearly twice as long as broad, with a transverse impression which makes it appear a little concave in profile. The declivous surface is more inclined than in *glaber*; it is not longer than the basal surface nor overhung by its posterior edge." The types are from Osaka.

29. *Iridomyrmex itoi abbotti* var. nov.

Worker. (Plate XLI, Fig. 3.) Length 1.75-2.25 mm.

Head, excluding the mandibles, a little longer than broad, with straight posterior and rather convex lateral borders. Clypeus rather convex in the

middle behind, flattened laterally, with a pronounced median excision in its anterior border. Eyes a little in front of the middle of the head. Frontal area distinct, triangular; frontal groove tenuous but distinct, not interrupted in the middle. Antennal scapes reaching to the posterior corners of the head. Thorax in profile with perfectly straight dorsal surface, interrupted by a deep but narrow mesoëpinotal depression. Basal surface of epinotum flat, decidedly shorter than the declivity which is concave and separated from the base by a sharp angle. Petiole vertical, as high and as broad as the epinotum, much compressed anteroposteriorly, somewhat thinner below than above, slightly flatter behind than in front; edge sharp, broadly and evenly rounded when seen from behind.

Mandibles shining, very finely striated, and coarsely and sparsely punctate. Whole body shining, distinctly reticulate, except the gaster which is very glabrous.

Hairs white, erect and much scattered on the vertex, gaster and mandibles. Legs and antennæ with sparse white pubescence.

Black; mandibles dark brown, legs dark brown or black, with yellow knees and tarsi; antennæ yellow with the tips of the scapes and the funiculi brown or blackish. Gaster with metallic violet reflections. In some specimens, possibly immature, the head and thorax are dark brown.

Described from numerous specimens collected by Professor J. F. Abbott at Itajima Aki.

I was at first inclined to regard this variety as a distinct species but Prof. Emery informs me that *abbotti* differs from the typical *itoi* only in the metallic violet color of the gaster.

30. *Technomyrmex gibbosus* sp. nov.

Worker. (Plate XLI, Fig. 4.) Length 2-2.5 mm.

Mandibles rather large, with straight multidenticulate blades. Head longer than broad; posterior border straight; sides rather convex. Clypeus convex, with a deep notch in the middle of its anterior border. Eyes large, flattened, in front of the middle of the head. Antennal scapes reaching a little beyond the posterior corners of the head; second funicular joint twice as long as broad, remaining joints, except the terminal, hardly longer than broad. Clypeal and antennal foveæ confluent. Frontal area obsolescent, frontal groove lacking. Thorax in front $\frac{3}{4}$ as broad as the head; pronotum broader than long; mesonotum as long as broad, mesoëpinotal constriction deep. Epinotum with very convex basal surface, which forms a right angle with the posterior slope of the mesonotum, and passes over into the declivity through a rounded angle; declivity twice as long as the base, flattened above and somewhat concave below. Petiole almost without a trace of a node, elliptical from above, about twice as long as broad. Gaster rather narrow, pointed behind, with a slit-shaped anus.

Mandibles lustrous or shining, faintly and sparsely punctate. Head and thorax opaque, finely and densely punctate or reticulate, the declivity of the epinotum in some specimens more shining. Gaster smooth and shining. Legs and antennæ subopaque like the head and thorax.

Hairs yellowish, inconspicuous, absent except on the mandibles. Pubescence whitish, very short and sparse, most distinct on the gaster and appendages.

Dull yellowish brown, gaster somewhat darker, mandibles, antennæ and legs yellow; femora and scapes brownish.

Described from numerous specimens collected by Mr. Hans Sauter at Yamanaka, Suruga ("1100 ft., sifted in deciduous forests"); Kanagawa and Takakiyama.

This species which at first sight resembles a pale *Tapinoma erraticum* or *T. sessile* is closely related to *Technomyrmex albipes*. It differs in its lighter color and the more gibbous structure of the epinotum as I find by comparison with specimens of that species from India and Madagascar. In these same characters and its smaller size *T. gibbosus* differs from *T. mayri* Forel of Madagascar. It differs from *T. grandis* Emery of Sumatra in lacking the erect hairs on the legs and antennal scapes and from *T. strenuus* Mayr of Borneo and Singapore in lacking the long hairs on the gaster, though it seems to resemble this species in the shape of the epinotum. Finally from *T. modigliani* Emery of Sumatra, the Japanese species may be readily distinguished by its much narrower head, feebler clypeal notch, shorter funicular joints, etc.

Subfamily CAMPONOTINÆ.

31. *Prenolepis flavipes* (F. Smith) Mayr.

Tapinoma flavipes F. SMITH, Trans. Ent. Soc. London, 1874, p. 404, ♀ ♀

Prenolepis flavipes MAYR, Verhandl. zool. bot. Ges. Wien, XXXVI, 1886, p. 363.

Prenolepis flavipes FOREL, Ann. Soc. Ent. Belg., XLV, 1901, p. 371.

Prenolepis flavipes FOREL, Bull. Soc. Ent. Suisse, X, 7, 1900, pp. 269, 270, ♀ ♀ ♂

Worker. Length 1.5–1.7 mm.

Mandibles 6-toothed. Head distinctly longer than broad, with rounded posterior angles. Clypeus convex, barely carinate, its anterior border deeply and rather broadly excised in the middle. Antennal scapes projecting for fully $\frac{2}{3}$ of their length beyond the posterior corners of the head; funicular joints all longer than broad. Pronotum broader than long; mesoepinotal depression pronounced, flat at the bottom, longer than the transverse diameter between the two stigmata. Epinotum with a short convex basal surface, passing insensibly into the longer and flatter declivity. Petiole low, in profile with convex ventral border and node inclined forward, the latter with both its anterior and posterior slopes slightly convex; edge viewed from behind straight.

Whole body smooth and shining; mandibles finely striated.

Hairs yellow; long, erect and tapering on the body; shorter and suberect on the legs and antennal scapes. Pubescence grayish, distinct on the head, antennæ and legs, but almost imperceptible on the remainder of the body.

Body and appendages yellow; clypeus, upper surface of head and gaster dark brown. Mandibular teeth black.

Female. Length 4.5-5 mm.

Dark brown; mandibles, mouthparts, antennæ and legs yellow; mandibular teeth black. Wings uniformly brownish, with brown veins. Surface of body finely shagreened but shining, covered with long grayish pubescence, as are also the legs and antennæ. Hairs sparse, yellowish, erect, like those of the worker.

Male. Length 1.5-1.6 mm.

Resembling the worker in size and coloration, except that the thorax is dark brown like the head and gaster. Mandibles, legs, antennæ and genital valves slightly infuscated. Surface of the head, thorax and gaster very glabrous. Wings like those of the female. For the conformation of the genital valves see Fig. 1, *a-c*. Erect hairs on the body similar to those of the worker but shorter, absent on the antennal scapes and very sparse on the legs. Pubescence almost imperceptible except on the legs.

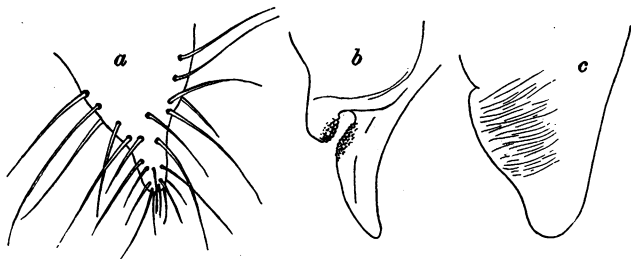


Fig. 1. *Prenolepis flavipes* (F. Smith), Mayr. Male. *a*, outer; *b*, median; and *c*, inner genital valve.

The types of this species are from Hiogo. Forel obtained workers from Osaka, and all three phases imported from Japan into Hamburg with plants. I have before me a large number of specimens of all three phases collected by Professor J. F. Abbott near the Marine Biological Laboratory at Misaki, and by Mr. Hans Sauter in the following localities: Kanagawa ("under bark at edge of pond"), Yamanaka ("sifted in deciduous and pine woods"), Negishi, Takakiyama and Okayama. There are several males from Okayama taken May 21, '05 and winged females from Kanagawa taken April 8, '05.

32. *Lasius niger* Linn.

F. SMITH, Trans. Ent. Soc. London, 1874, p. 403.

FOREL, Bull. Soc. Ent. Suisse, X, 7, 1900, p. 269, ♀

FOREL, Mittheil. naturhist. Mus. Hamburg, XVIII, 1901, p. 66.

Numerous workers and a few dealated females of this well-known ant were collected by Professor J. F. Abbott near the Marine Biological Laboratory at Misaki, and by Mr. Hans Sauter in the following [Sept., 1906.]

localities: Yamanaka, Suruga (1300, 1700 and 2000 ft.; "in rotten wood and under oak bark"), Kanagawa ("pine woods, on heaths, and along the edges of brooks") and Takakiyama. These specimens all closely resemble the typical European *niger*, in size, coloration and the hairiness of the legs and antennæ. Forel had specimens from Yezo and Osaka.

33. *Lasius niger* Linn. var. *alienus* Förster.

ERN. ANDRÉ, Bull. Mus. d' Hist. Nat. Paris, 1903, p. 128, ♀ ♀

A single worker of this variety was found among the material collected by Mr. Hans Sauter at Kanagawa.

34. *Lasius niger brunneus* Latreille.

Lasius brunneus FOREL, Mitth. naturhist. Mus. Hamburg, XVIII, 1901, p. 66.

Recorded by Forel from Yokohama.

35. *Lasius umbratus* Nylander.

FOREL, Bull. Soc. Ent. Suisse, X, 7, 1900, p. 269 ♀

FOREL, Mittheil. naturhist. Mus. Hamburg, XVIII, 1901, p. 66.

A single winged female taken during July, 1901, by Mr. Hans Sauter at Okayama. The species is also recorded from Osaka by Forel.

36. *Lasius flavus myops* Forel.

A single worker taken by Mr. Hans Sauter at Kanagawa agrees very closely with typical specimens of this subspecies from Terni

37. *Lasius fuliginosus* Latreille.

F. SMITH, Trans. Ent. Soc. London, 1874, p. 403.

A number of workers and males collected by Mr. Hans Sauter at Kanagawa (July 2, '05) "under the bark of an oak tree" are indistinguishable from European specimens.

38. *Formica sanguinea* Latreille.

ERN. ANDRÉ, Bull. Mus. d' Hist. Nat. Paris, 1903, p. 128, ♀

Possibly the female of the following variety, which was described from worker specimens only.

39. *Formica sanguinea* Latreille var. *fusciceps* Emery.

EMERY, Zool. Jahrb., Abth. f. Syst., VIII, 1894, p. 335, *nota*, ♀

Emery's description of this variety, based on three workers from Yokohama, shows it to be closely related to the North American *F. sanguinea aserva* Forel, which is also characterized by the dark color of the head.

40. *Formica rufa pratensis* DeGeer.

Formica pratensis FOREL, Ann. Mus. Zool. Acad. Impér. Sc. St. Pétersb. VIII, 1903, p. 18, ♀

Forel records a female of this palearctic subspecies of *F. rufa* L. from the island of Sakhalin. It will probably be found also in the northern portion of Japan or at high altitudes.

41. *Formica rufa truncicola* Nylander.

Formica truncicola FOREL, Ann. Mus. Zool. Acad. Impér. Sc. St. Pétersb., VIII, 1903, p. 18, ♀

Formica rufa r. *truncicola* ERN. ANDRÉ, Bull. Mus. d' Hist. Nat. Paris, 1903, p. 128, ♀

Forel has also recorded a female of this subspecies from the Island of Sakhalin. Ern. André mentions a specimen of the same sex from Japan.

42. *Formica rufa truncicola* Nylander var. *yessensis* Forel.

FOREL, Mittheil. naturhist. Mus. Hamburg, XVIII, 1901, p. 66, ♀

This variety, according to Forel, "is distinguished from the typical *truncicola* by its sparser erect hairs, which are very sparse on the antennal scapes and completely lacking on the extensor surface of the tibiae; only on their lower surfaces are there any of the oblique, stouter hairs. The basal surface of the epinotum is also somewhat shorter and more convex." The types of this apparently northern form were collected in Serachi, province Ishikari, Yezo.

43. *Formica fusca* Linn. var. *nipponensis* Forel.

FOREL, Bull. Soc. Ent. Suisse, X, 7, 1900, p. 270, ♀

FOREL, Mitth. naturhist. Mus. Hamburg, XVIII, 1901, p. 66, ♀

ERN. ANDRÉ, Bull. Mus. d' Hist. Natur. Paris, 1903, p. 128.

Numerous workers collected by Professor J. F. Abbott near the Marine Biological Laboratory at Misaki and by Mr. Hans Sauter at Kanagawa (1700 ft.; "nest in ground on border of pond") and Takakiyama. Forel's specimens were from the island of Yezo and from Tokio.

The head and thorax of this variety resemble in their lustre the corresponding parts of the European *fusca* and the North American var. *subsericea*, but, as Forel has remarked, the gaster is much more opaque than in either of these forms. The legs and antennæ are redder than in the typical *subsericea*.

44. *Camponotus herculeanus japonicus* Mayr.

Camponotus japonicus MAYR, Verhandl. zool. bot. Ges. Wien, XVI, 1866, p. 885, ♀

Camponotus japonicus F. SMITH, Trans. Ent. Soc. London, 1874, p. 403, ♀

Camponotus herculeanus r. *pennsylvanicus* var. *japonicus* FOREL, Bull. Soc. Vaud. Sc. Nat., XVI, 1879, p. 56, ♀ ♀ ♂

Camponotus pennsylvanicus var. *japonicus* EMERY, Ann. Soc. Ent. France, 1893, p. 268.

Camponotus japonicus ERN. ANDRÉ, Bull. Mus. d' Hist. Nat. Paris, 1903, p. 128, ♀

Camponotus pennsylvanicus var. *japonicus* FOREL, Ann. Mus. Zool. Acad. Impér. Sc. St. Pétersb., VIII, 1903, p. 380, ♀ ♂

Camponotus japonicus BINGHAM, Fauna Brit. Ind., Hymenopt., II, 1903, p. 370, 371, fig. 117, ♀

This ant is represented in my collection by a number of workers, soldiers and females (one winged) collected by Mr. Hans Sauter at Kanagawa, Takakiyama and Bukenji near Yokohama; several soldiers and workers collected by Professor J. F. Abbott near the Marine Biological Laboratory at Misaki; one deâlated female, two soldiers and two mediæ marked "Japan" (Coll. Am. Mus. Nat. Hist.) and a soldier and worker from Chemulpo, Corea (Coll. Phila. Acad. Sci.).

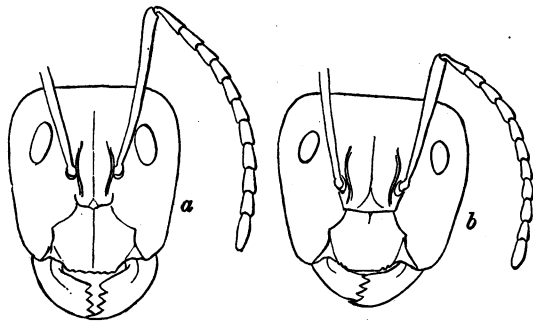


Fig. 2. *a*, Head of worker major of *Camponotus herculeanus japonicus* Mayr; *b*, head of worker major of *C. h. pennsylvanicus* De Geer.

Comparison of these specimens with a long series of our North American *C. herculeanus pennsylvanicus* convinces me that the Japanese form should rank as an independent subspecies. Not only is the clypeus of the soldier longer and more projecting, and the anterior border of the head red, as Forel has pointed out, but the head is narrower and has more flattened sides than in the American form (see Fig. 2*a* and *b*). The types of *japonicus* are in the Leyden Museum.

Forel has seen specimens from Osaka and also from southern Ussuri, Sidemi, Western China. Bingham has recorded it from the Karen and Shan Hills, Burma. Emery has noted its occurrence in the Philippines (Mindanao). He has also described two very similar Asiatic varieties of *herculeanus*, namely *punctatissimus* from Burma (Carin Cheba, 900–1100 m.) and *aterrimus* from Eastern Siberia. It may be admissible to attach these to the subspecies *japonicus*, which would then include all the East Asiatic *herculeanus*,—even the variety *sachalinensis* Forel (*vide infra*),—excepting the forms that are referable to the subspecies *ligniperdus*.

45. ***Camponotus herculeanus* Linn. var. *sachalinensis* Forel.**

FOREL, Ann. Mus. Zool. Acad. Impér. Sc. St. Pétersb., VIII, 1903, p. 14, ♀

Based on female specimens only, collected in Mongolia, Manchuria and Sakhalin. According to Forel, this variety “differs from the typical *herculeanus* in its entirely black color (mandibles included) and its feeble sculpture, which renders it smooth and more shining. The pubescence on the gaster is also shorter and sparser. These last characters ally this variety with *ligniperdus*, from which it differs however in color and the more thickset stature which is identical with that of *herculeanus*. The wings are exactly like those of the typical *herculeanus* and very different from those of *ligniperdus* and *vagus*. The sculpture and pilosity separate this variety completely from *pennsylvanicus* and *vagus*.”

46. ***Camponotus herculeanus ligniperdus* Latreille var. *obscuripes* Mayr.**

Camponotus ligniperdus var. *obscuripes* MAYR, Verhandl. zool. bot. Ges. Wien, XXVIII, 1878, p. 645, ♀

Camponotus ligniperdus var. *obscuripes* FOREL, Bull. Soc. Ent. Suisse, X, 7, 1900, p. 270.

Camponotus ligniperdus var. *obscuripes* FOREL, Mittheil. naturhist. Mus. Hamburg, XVIII, 1901, p. 70.

Camponotus ligniperdus var. *obscuripes* ERN. ANDRÉ, Bull. Mus. d'Hist. Natur. Paris, 1903, p. 128, ♀ ♂

Of this variety, which is not represented in the material collected by Mr. Hans Sauter and Professor J. F. Abbott, Forel examined specimens from Osaka.

47. ***Camponotus marginatus vitiosus* F. Smith.**

Camponotus vitiosus F. SMITH, Trans. Ent. Soc. London, 1874, p. 403, ♀

Camponotus marginatus MAYR, Verhandl. zool. bot. Ges. Wien, 1878, pp. 645, 646.

Camponotus marginatus subsp. *vitiosus* EMERY, Zool., Jahrb. Abth. f. Syst., VII, 1893, p. 675, *nota*.

Camponotus marginatus race *vitiosus* FOREL, Bull. Soc. Ent. Suisse, X, 7, 1900, p. 270.

Worker major. Length 5-5.5 mm.

Mandibles, clypeus and anterior $\frac{3}{4}$ of head subopaque, finely and densely punctate and in addition with shallow, scattered foveolæ. Remainder of body shining, thorax sharply, occiput and gaster much more finely and indistinctly shagreened.

Hairs pale yellow, erect, obtuse and abundant on the mandibles, cheeks and front; longer on the thorax and edge of petiole; sparse and rather inconspicuous on the gaster.

Black; mandibles, anterior third of head, antennæ and legs deep red or brown; in some specimens the trochanters, tips of the coxæ and lower portion of the petiole are yellow; tips of antennæ infuscated.

Worker minor. Length 3.5-4.5 mm.

Resembling the worker major except that the anterior portion of the head is not foveolate, the legs are more yellow and the hairs on the cheeks are less numerous and mostly appressed.

Described from numerous workers taken by Mr. Hans Sauter at Kanagawa from a single colony nesting "in an old oak."

While the above described form is certainly a variety or subspecies of the well-known palearctic and nearctic *marginatus*, I am unable to state positively that it is the true *vitiosus* of F. Smith. None of the authors mentioned in the above synonymy has given a careful description of *vitiosus*, and it is not improbable that *marginatus* is represented in Japan by several undescribed varieties.

48. *Camponotus marginatus* Latreille var. *quadrinotatus* Forel.

FOREL, Ann. Soc. Ent. Belg., XXX, 1886, p. 142, ♂ ♀

FOREL, Bull. Soc. Ent. Suisse, X, 7, 1900, p. 270.

The types of this beautiful variety are in the Berlin Museum. I have examined a single worker media collected by Mr. Hans Sauter at Kanagawa, and a winged female, male, two major workers and a worker minor collected by Professor Mitsukuri, probably near Tokio, and kindly sent me by Dr. William H. Ashmead. As Forel has shown, the worker major differs from that of the typical European form in having a proportionally larger head. The two ivory yellow spots on the first gastric segment are sometimes confluent. The hitherto undescribed male is deep black, without a trace of spots on the gaster. At first sight one would be inclined to regard this form as more than a mere variety of *marginatus*, but closer examination

shows that the only important character is the maculation of the gaster in the females and workers, and large series of specimens will undoubtedly show that this character is highly variable. Similar conditions are seen in the American *C. landolti* and in *C. quadrimaculatus* of Madagascar. Both of these species show all gradations between a beautiful development of gastric spots and their complete absence. A somewhat similar condition is seen also in the American *C. ruficeps*.

49. ***Camponotus marginatus brunni* Forel.**

FOREL, Mittheil. naturhist. Mus. Hamburg, XVIII, 1901, p. 70, ♀

Forel based this subspecies on the worker minor obtained from Hozuyama. It resembles the variety *quadrinotatus* but lacks the white spots on the gaster and has a blunt petiole.

50. ***Camponotus (Colobopsis) rothneyi* Forel.**

Camponotus (Colobopsis) rothneyi FOREL, Journ. Bombay Nat. Hist. Soc., VII, 1893, p. 435, ♀ ♀

Colobopsis rothneyi BINGHAM, Fauna. Brit. India, Hymenopt., II, 1903, p. 346.

A single soldier and dealated female, agreeing very closely with Forel's description of this species, were taken by Mr. Hans Sauter at Okayama. There are no pale spots on the gaster as in the European *C. truncatus*, of which it may be merely a subspecies. Forel has described from Singapore a form which he calls *C. rothneyi* r. *krafti*.

51. ***Polyrhachis lamellidens* F. Smith.**

F. SMITH, Trans. Ent. Soc. London, 1874, pp. 403, 404, ♀

MAYR, Verhandl. zool. bot. Ges. Wien, 1878, p. 652, ♀

FOREL, Bull. Soc. Ent. Suisse, X, 7, 1900, p. 270.

FOREL, Mittheil. naturhist. Mus. Hamburg, XVIII, 1901, p. 78.

BINGHAM, Fauna Brit. India, Hymenopt., II, 1903, p. 403, fig. 139, ♀

Worker. (Plate XLI, Fig. 2.) Length 6-6.5 mm.

Mandibles with 4 subequal teeth. Clypeus convex, anteriorly subcarinate. Head convex above, excluding the mandibles about as broad as long, with rounded sides and occipital border. Thorax with steep, flattened, lateral and concave dorsal surfaces, meeting on each side in a prominent ridge, which is sharply interrupted at the pronounced promesonotal and mesoepinotal sutures. Pronotum about as broad as long, its lateral ridge continued anteriorly on each side into a long spine, which is directed outward and forward and curved downward at its tip. Mesonotum broader than long, bearing at the middle of

each side a rapidly tapering spine about half as long as those of the pronotum, and curved upward, outward and especially backward. Basal surface of epinotum $1\frac{1}{2}$ times as long as broad, terminating behind in a pair of very blunt flat spines, which are directed backward and somewhat outward and upward. The ridge along the side of the basal surface is sometimes crenate or serrate and is always continued down along the side of the declivity, which is very sloping and about as long as the basal surface. Petiole seen from above as long as broad, very thick above where it bears a pair of long, somewhat flattened, hook-shaped spines, which diverge laterally and somewhat posteriorly from their very insertions. Gaster spherical.

Head, legs and gaster shining, finely shagreened. Mandibles finely striated. Thorax and petiole opaque, punctate-rugulose, the dorsal surface of the former more uniformly punctate. Upper anterior surface of the petiole very finely and transversely rugulose.

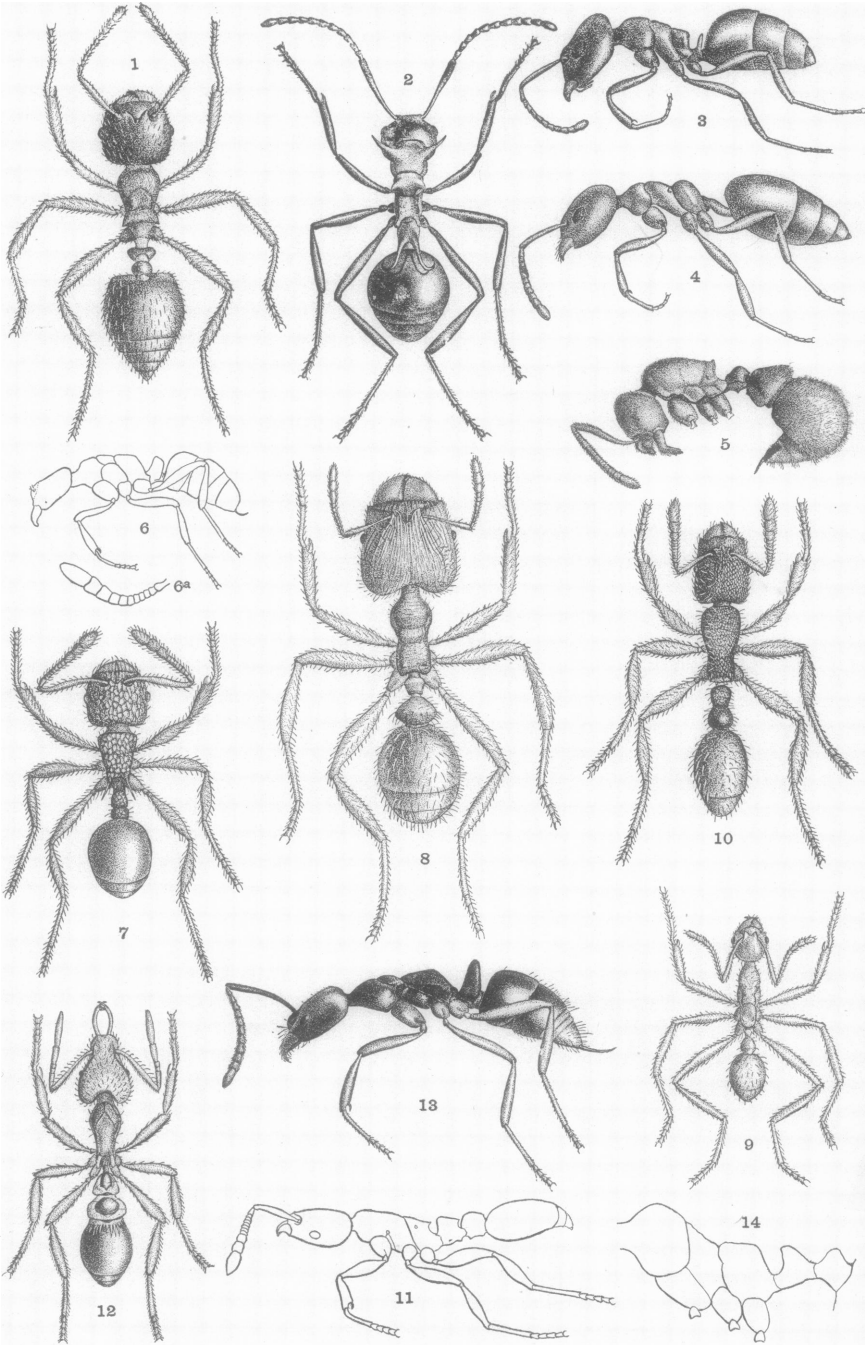
Mandibles, legs and occiput with sparse, suberect grayish hairs. Pubescence pale, very sparse on the head, legs and gaster; more abundant, but by no means concealing the sculpture, on the pleuræ and base of the gaster.

Thorax and petiole dark red, tips of thoracic and petiolar spines and remainder of the body deep black.

Several workers taken by Mr. Hans Sauter at Okayama. Smith's types and the specimens studied by Forel were from Hiogo. Smith mentions the species as occurring also in Hong-Kong. Bingham has described a closely related species, *P. craddocki* from India. In this species the pronotal spines do not point downward, the mesonotal spines are nearly vertical and the petiole is "surmounted by two cylindrical spines which rise vertically and are close together and parallel for three-fourths of their length from the base." In *P. lamellidens* the petiolar spines diverge from their very bases.

EXPLANATION OF PLATE XLI.

- FIG. 1. *Cremastogaster laboriosa* F. Smith var. *matsumurai* Forel. Worker.
 FIG. 2. *Polyrhachis lamellidens* F. Smith. Worker.
 FIG. 3. *Iridomyrmex itoi* Forel var. *abbotti* var. nov. Worker.
 FIG. 4. *Technomyrmex gibbosus* sp. nov. Worker.
 FIG. 5. *Sysphincta watasei* sp. nov. Worker.
 FIG. 6. *Pachycondyla (Pseudoponera) sauteri* sp. nov. Worker. Fig. 6a antennal funiculus of same.
 FIG. 7. *Pristomyrmex japonicus* Forel. Worker.
 FIG. 8. *Pheidole nodus* F. Smith. Soldier.
 FIG. 9. *Pheidole nodus* F. Smith. Worker.
 FIG. 10. *Vollenhovia emeryi* sp. nov. Worker.
 FIG. 11. *Vollenhovia emeryi* sp. nov. Worker, in profile.
 FIG. 12. *Strumigenys godeffroyi* Mayr var. *lewisi* Cameron. Worker.
 FIG. 13. *Euponera (Brachypонера) solitaria* F. Smith. Worker.
 FIG. 14. *Stenamma (Messor) aciculatum* F. Smith var. *brunneicorne* Forel. Thorax and pedicel of worker in profile.



R. B. Howe del.

JAPANESE ANTS.

