

# MONOGRAPH OF THE NEARCTIC HYMENOPTERA OF THE GENUS *BRACON* FABRICIUS.

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## INTRODUCTION.

The following paper gives the results of a portion of the work done on a collection of insects of the subfamily Agathinae of the family Braconidae. Under the existing circumstances it has not been found possible to go over the whole of the collection, nor to put into completed form more than the monographic classification of this one genus. The collection from which specimens were examined was obtained from the following sources, mostly through the kindness of Prof. J. C. Bradley of Cornell University, under whose direction the work was started; the greatest number came from the United States National Museum, about 1,000 specimens belonging to this subfamily being obtained there; the next largest collection came from the Academy of Natural Sciences at Philadelphia, but unfortunately none of these have been available for final examination. In addition, specimens were obtained from the Cornell University collection, the American Museum of Natural History, Prof. C. T. Brues of Bussey Institution, Mr. C. W. Johnson of the Boston Society of Natural History, Mr. W. M. Mann of Bussey Institution, and Mr. Nathan Banks.

In addition to expressing my appreciation of the kindness of the United States National Museum authorities in charge of the insect collections and of the above-mentioned gentlemen, I also wish to thank Professor Bradley for many suggestions during the early part of the work which was started at Cornell University, Dr. Henry Skinner for permission to examine the Cresson types in the Academy of Natural Sciences in Philadelphia, and Prof. V. L. Kellogg for many ideas regarding the basis upon which species limits should be determined. The drawings accompanying the paper were made by Mr. C. H. Kennedy. Most of the work was done in the entomological laboratory of Stanford University.

## SUBFAMILY AGATHINAE.

The following characters, taken from the papers of Szepliget and Ashmead, will show what forms are to be included here: Abdomen inserted at the apex of the propodeum between the hind coxae; mandibles, when closed, with their tips touching or crossing, not forming a rounded opening in conjunction with a semicircularly emarginate clypeus; abdomen subsessile, the dorsum showing the usual sutures, except between the second and third tergites; radial cell very narrow, and not approaching the tip of the wing, the second cubital cell (areola) very small, or wanting in some cases; eyes not hairy. The very small or missing second cubital cell, and the narrow radial cell, with the radial vein running parallel or almost parallel to the margin of the stigma, are the most easily recognized and most distinctive characters. In the older classifications, best presented by that of Marshall, this subfamily was included with the Microgasterinae in the group Areolarini of Wesmael, but the last two general classifications, that of Ashmead (1900) and Szepliget (1904), present the subfamilies without attempting to group them in higher units.

Twenty-five known genera are recognized by Szepliget, while he gives five additional, which contain no described species or are not recognizable. Since the publication of his paper some five or six new genera have been described, while of this number, 10 genera have been reported or described from the United States. Species belonging in the subfamily have been recorded from all of the larger land areas of the earth, and from some islands, as Hawaii and the Philippines. At present a majority of the known species are from the Palearctic and Nearctic regions, but it seems probable that a more thorough collection throughout the world will show that the species are most abundant in tropical regions.

It is obvious, even from the limited study which I have made of the different species included in this subfamily, that a revision of the genera is greatly needed. The one character to which most importance has been attached since the beginning of attempts at classification, the shape and appearance of the head when viewed from in front, is easily shown to be of little or no value generically, if any considerable series of species is examined, although it seems to be useful for specific determination, and is somewhat characteristic in certain genera. However, it is impossible to draw any distinguishing line, based on this character, between the genera *Agathis* and *Bassus* (*Microdus*), as they are at present recognized in this country, although Förster, followed by Ashmead in his classification of the Ichneumon Flies, divided the subfamily into two tribes, the *Agathidini*, with the head as viewed from in front shaped as an elongate isocetes triangle, and the *Microdini*, with the head short and forming an equilateral

triangle. The more recent classifications, particularly that of Szepligeti, make no attempt to group the genera into units of higher rank.

It is necessary to discuss a recent change in synonymy, given by Viereck in his paper on the Type Species of the Genera of Ichneumon Flies,<sup>1</sup> in order to make clear the use of a certain generic name which has long been associated with another group of parasitic Hymenoptera. This change of name is taken from Viereck's paper referred to above, as I have not had access to Curtis's British Entomology to verify Viereck's conclusions.

Fabricius described the genus *Bracon* in his *Systema Piezatorum* in 1804, page 102, with a number of included species. Curtis in his *British Entomology* (1825), No. 69, designated the species described as *Ichneumon desertor* by Linnæus, and included in *Bracon* by Fabricius, as the type of the genus *Bracon*. Not until 1862 did Förster<sup>2</sup> designate *Bracon minutator* Fabricius as the type of *Bracon*, and so establish the present-day conception of the genus. In the same paper (p. 246) Förster established the new genus *Cremonops* and included the single species *Agathis deflagrator* Nees, which is the same species as *Ichneumon desertor* Linnæus. From this it is clear that the genus name *Bracon* will have to be applied to those species at present included in the genus *Cremonops*, and that *Cremonops* Förster is a synonym of *Bracon* Fabricius. It is extremely unfortunate that taxonomic work on the parasitic hymenoptera should be still further complicated in this fashion, but there seems to be no other alternative if the International Code of Nomenclature is followed.

#### GENUS *BRACON* FABRICIUS (*CREMONOPS* FÖRSTER AND OF AUTHORS).

The following characters, not all of which, however, are distinctive, will serve to indicate the species belonging to this genus:

Head elongate, at least nearly as long as wide, strongly produced below the eyes, and much narrowed towards the labrum; malar space varying from a little shorter to a little longer than the height of the eyes; antennæ placed in large pits, with two distinct, more or less platelike projections between them, and with a ridge bordering the upper surface of each pit, at least for part of the distance between the compound eyes and the lateral ocellus on each side; ocelli arranged in a nearly equilateral triangle; antennæ elongate, black, except in immature specimens, more than 35-segmented; labrum at least nearly as long as wide, its lower edge margined by a more or less distinct ridge; mandibles curved inwards, the tips bidentate, the inner tooth shorter than the outer; maxillæ and labium united and elongated to form a distinct beak, the segments of both maxillary and labial

<sup>1</sup> U. S. Nat. Mus. Bull. 83, 1914.

<sup>2</sup> Verh. naturh. ver. preuss. Rheinland, vol. 19, 1862, p. 235.

palpi elongate; apex of the pronotum with large deep pits on each side of the middle line, these united in one species; mesonotum with well-developed parapsidal furrows, these often crenulate, at least in the middle, the median lobe distinctly grooved longitudinally, the lateral lobes more or less flattened; hind angles of the mesoscutum usually produced into a vertically compressed plate, fingerlike in one species; mesopleural furrow present, varying in size and shape; propodeum coarsely areolate, with three longitudinal ridges on each side; spiracles of the propodeum oval; wings fuliginous, the second cubital cell (areolet) four-sided, never triangular; legs long, rather slender, middle tibiae usually, hind tibiae always, with one or more spines at the apex; at least the fore, usually the intermediate, and often the hind tarsal claws cleft, if not cleft then broad and long-toothed at the base; abdomen elongate, first segment long and usually slender; ovipositor in general about as long as the abdomen, sometimes a little shorter; colors, black, and various shades of red, running to yellow.

The genus as defined above includes 12 recognizable species from America north of the Mexican border, of which number only one was originally described as belonging in the genus, while two have been transferred from the genus *Agathis*, and nine are described as new. The specimens available for examination show that the species are widely distributed over the whole of the United States, and it seems probable that only lack of collections is responsible for the meager Canadian records.

#### EXTERNAL ANATOMY.

The following rather brief account of the external anatomy, based largely on a study of *B. vulgaris*, will make clear some of the structural characteristics not fully discussed in the specific descriptions:

*Head.*—The head is hypognathous, transverse, and strongly produced below the eyes, usually longer from the apex of the clypeus to the top of the lateral ocelli than the extreme width through the compound eyes. The compound eyes are of medium size, varying from a little longer to a little shorter than the malar space, oval in shape, with the back side flattened, as viewed from the side, semicircular in outline with the inner side somewhat curved as viewed from above, and half oval with the inner side slightly curved as viewed from in front. They approach most closely to each other at a point a little below the antennal pits. The upper portion of the vertex is rounded into the occiput behind and the face in front, except in the middle, where it is strongly excavated on each side to form two pits for the reception of the antennae. The lateral ocelli are placed on the apex of the vertex, usually a little closer to each other than to the margins of the compound eyes, and from them each antennal pit slopes

steeply, almost vertically downwards to the insertion of the antenna. Between the antennal insertions are a pair of triangular or almost platelike projections, separated along the median line by a triangular or rounded groove, and with their front edges in the same plane as the face, rounded off at the apex, and extending backwards between the antennae as a pair of small ridges which may reach the lower edge of the median ocellus. This median ocellus is placed on the sloping surface of the vertex, and approximately as far from the lateral ocelli as they are from each other. The median ocellus is circular in outline, while the two lateral ocelli have the inner front margins somewhat flattened. All of the ocelli are placed on slight elevations, and the vertex is more or less swollen between the lateral ocelli, the elevation in some cases approaching the appearance of an obsolete, very short, longitudinal ridge. A more or less distinct marginal ridge runs along the lower border of each antennal pit to where this border turns upwards parallel to the eye margin, while from here on, at least, the ridge is distinct and nearly always swells into a low arch which is most prominent opposite some point on the median ocellus, as the lower margin, the upper margin, or the middle. From the highest point the ridge decreases in height gradually until it reaches the lateral ocellus on its side, or in some cases until it becomes obsolete some distance from the lateral ocellus. The head tapers rapidly behind the eyes, and the occiput is strongly emarginated.

In all normal specimens the whole of the vertex, the occiput, and the head behind the eyes, and usually the cheeks are shining and often appear polished, while the punctuation, and with it the hairiness, varies from quite dense to wholly lacking over the various parts mentioned. Usually there is a distinct fringe of hairs, most noticeable in front and below, surrounding the compound eyes. The face proper extends from the antennal fossae to the clypeal foveae, two small deep pits located diagonally below and inside the lower corner of each eye. Even cleared specimens show no transverse suture separating the face from the clypeus, and for purposes of description I have taken the face as extending from the antennal pits to the tip of the clypeus. The face is nearly always triangularly flattened below the antennae, the flattened area starting near the outer lower angle of each fossa, and coming to a point on the median line of the face not far below the interantennal plates. A more or less distinct groove runs from between the interantennal plates to the lower end of this flattened area. The largest and most closely placed punctures found on the head are located on this flattened surface and on the face on each side of it. Nearer the sides the punctures become smaller until the malar space and at least the lower portion of the clypeus are rather finely punctate. From each clypeal fovea a suture, superficially often wholly obsolete, runs to the lower corner of the head on

each side. The head bulges more or less behind the eyes, depending on the species, and the whole hinder surface is cut out for about the lower two-thirds of its length for the attachment to the thorax, and principally for the reception of the elongated beak, which roughly resembles that found in the long-tongued bees.

The antennae are elongate, longer than the head and thorax, slender, black in all maturely colored specimens, thickest at about the fifth to seventh segments, tapering apically to a point. The number of segments found in the antennae varies from 35 to 45. The first segment or scape (these two terms being used indiscriminately in the specific descriptions) is small at its base, but much swollen above and somewhat flattened, with the apical margin usually rounded but produced into a small blunt tooth in one species. The second segment is small and about the same diameter as the flagellum. Both of these segments are smooth and shining and sparsely punctured and hairy. The remaining segments of the flagellum are cylindrical, slightly constricted in their middle, dull, distinctly striate longitudinally, and closely covered with short, stout, decumbent hairs. The terminal segment is oval in shape with the apex pointed, sometimes indistinctly separated from the preceding segment, and the terminal segments show a more decided intersegmental constriction than do the basal ones.

The labrum is attached to the lower end of the clypeus in such a way that it is slightly less prominent than the face. It is straight in profile, but strongly arched transversely, and varies from distinctly narrower than long to slightly wider than long. Typically the whole outline is curved from the narrow attachment at the top to the tip. Sometimes the apical margin is nearly straight for a short distance on each side of the middle line, while in one species the sides appear to be nearly straight for a little way, and usually the margins from the rounded lateral sides to the attachment to the clypeus are straight or almost straight. The lower border is more or less raised to form a low marginal ridge which fades out on the sides. The whole surface of the labrum is shining and usually smooth, although in many cases the punctures are large enough to break up the smooth appearance. The punctation, and with it the hairiness, is sparse, but the hairs are relatively long. The coloration is variable, although usually the same as that of the face. The mandibles are strongly curved inward near the apex, sharp pointed, and with a large tooth inside near the tip. They are triangular in section near the middle, with the outer side slightly rounded off and the base enlarged, while compared with other members of the subfamily they are relatively narrow. Usually they are pale except for the extreme tips, but in some species they are wholly dark.

The beak is made up of the two maxillae and the labium, which are united to each other by membranes. All of the parts are elongated, particularly the sclerites of the maxillae. The relative thickness and length of the maxillary and labial palpi vary in the different species, but not greatly enough to be of value for identification. An idea of the general appearance of the beak may be obtained from plate 25, figures 4 and 5. With the possible exception of the labrum, none of the mouth parts appear to show any variations large enough to be considered as of use in distinguishing species.

*Thorax.*—The thorax is somewhat longer than high, compressed, and about as wide as the head. The pronotum is very narrow in front and widens out on each side into a triangular lobe reaching back to the tegula and downwards to the insertion of the fore coxae. Typically there is a pair of small oval pits, each tapering to a point below and surrounded by a more or less distinct ridge, which continues downward to the front margin of the lobe, on each side of the median line and separated from each other by a distance about equal to the length of one pit. These pits are deepest at the top and gradually become shallower and narrower below, while they are connected by a more or less distinct suture which is either curved or obtusely angled toward the cephalic margin of the pronotum on the median line. In one species these apical pits are replaced by a large deep transverse groove. The hinder, lower, and front margins of the pronotal lobes are elevated to form a narrow ridge running from the spiracle below the tegula on one side around to that on the other. The front margin of each lobe is interrupted a little above its middle by the intrusion of the carina from the pronotal pit, this ridge being much more prominent than the one bordering the lobes. The face of each lobe is depressed along a straight line running from the apical pits to the lower corner of the lobe in such a way that the whole hinder portion of the lobe forms one face of the very flat groove and the cephalic border flares sharply to form the other face, this depression being for the reception of the fore femora. A shallow crenulate groove parallels the hind border, separating a narrow strip from the main portion of the lobe.

The dorsal surface of the pronotum is punctured as is the front border of each lobe, while most of the central portion is smooth and not punctured, although this varies according to the species. There is a band of fine punctures along the upper border, while the narrow strip behind the crenulate groove is closely and densely punctured, as is the lower angle of each lobe. The epimera of the prothorax are completely hidden by the pronotal lobes, and they are separated from the proepisternum of each side by a sharp ridge which lies against and fits closely to the marginal ridges of the pronotal lobes. The episterna are elongate narrow lobes, apparently united

above just below the attachment of the head, then distinctly but very narrowly separated and once more apparently united before they attach to the small prosternum which is a depressed triangular piece seemingly wedged in between the apices of the two episternal lobes. The surface of the prosternal lobes usually appears to be rather closely covered with long, somewhat decumbent hairs, all directed downward, sometimes giving a silvery appearance. A close examination of the surface of the lobes shows that the punctures in which these hairs are inserted are large enough to break up its smoothness and to give it a roughened appearance, although the extent of this appearance varies with the species and even within the species. In all of the species examined the large lobes end in smooth, highly polished and, at most, finely punctate areas, which flare out laterally to meet the tips of the pronotal lobes.

The mesonotum is elongate, strongly narrowed in front, and much higher than the pronotum. In all of the members of the genus the parapsidal furrows are well developed, and in many of them they are crenulate for at least a part of their length. The parapsidal furrows are usually straight or almost straight, although they frequently become wider and shallower behind and seem to curve toward each other just as they meet at a variable distance before the scutellar fossa, while a more or less distinct depression runs from their junction to the scutellar fossa. These furrows divide the mesonotum into three distinct lobes, the praescutum of the mesothorax, usually termed the median or middle lobe in descriptions, and the two parts of the mesoscutum, termed the lateral lobes.

The somewhat oval or oblong tegulae are located just below the widest portion of the mesonotum. The lateral lobes are narrowed behind, and then continued straight backwards till they end opposite the hind wall of the scutellar fossa, typically in a sharp, high vertical ridge which is continuous with that running along the whole margin of the mesoscutum and which runs downward and outward ending near the caudal portion of the attachment of the forewing. The surfaces of all three mesonotal lobes are sparsely punctured and hairy, although the extent of this varies according to the species. The scutellar fossa is large and deep, oblong in shape and closed at each end by a wall approximately equal in height to the surfaces it joins. The hinder wall is nearly vertical but the front wall may vary from nearly vertical to strongly sloping forward. The fossa is always bisected by a high carina longitudinal to the body, while there are a varying number of smaller or almost obsolete carinae parallel to this on each side of it. The scutellum is roughly triangular in shape, tapering behind, with the sides and apex strongly rounded off, and with the hinder, nearly vertical, face slightly elevated to form a more or less distinct, broad, transverse band, which is narrowest at the



median line. Below the rounded-off dorsal margins of the scutellum the sides form flattened, depressed, vertical faces, which are usually highly shining, and may be vertically ridged. The mesopleura form a five-sided, nearly flat area on each side of the thorax, running downwards and backwards from below the attachments of the forewings. Each is separated from the metapleurum by a smooth diagonal suture, while an incomplete, sometimes shallow, at least partially crenulated groove is all that separates the pleurum of each side from the venter, and it appears doubtful if it always represents the remnant of a suture. A strongly crenulated furrow parallels the hind margin of the pleurum for nearly all of its length, separating a relatively narrow band from the main portion, and this band appears to be all that is left of the epimeron of the mesothorax. A strip along the front margin, widening out strongly above, but variable in width according to the species, is slightly but sharply elevated above the rest of the mesopleurum. Usually this area is more closely punctate than the disk of the pleurum which is sparsely punctate and hairy.

A sharp crenulated ridge runs along the lower part of the front margin of each pleurum and continues around the same margin of the venter. The pleura and sternum are sharply truncate below in front, with the space thus formed curving backwards and downwards from the prothorax and receiving the fore coxae. The two halves of the sternum are rounded off on the sides, and separated medially by a sharp crenulate furrow. The venter is usually much more closely punctured and more hairy than the pleura, but there is no distinct line of demarcation between the two areas as regards frequency of punctuation.

The metanotum is a transverse plate, curving forwards on each side, with each outer hind angle rounded into a flat lobe, excavated on each side of the middle, and still more just inside of the attachment of the hind wings, while in the middle there are three high carinae which meet medially near the caudal margin of the metanotum. Two of these carinae run backwards on each side of the middle from the cephalic margin to form a triangular or nearly semicircular inclosure with its base forward, and the third ridge runs steeply, sometimes vertically, downwards until it almost meets a corresponding ridge of the propodeum, leaving a deep notch between the metanotum and the propodeum. The metapleura are roughly triangular in shape with the sharpest angle pointing forward. They show no traces of sutures separating the episternum and epimeron on each side, but there is a deep, very coarsely crenulate, nearly vertical, furrow running downwards from the suture between metanotum and propodeum and dividing the surface into two areas, the cephalic one long, triangular, with the base above and the apex just above the insertion of the middle coxa, and the caudal one occupying the remainder of

the pleurite, bounded above by the lateral propodeal carina, and drawn out below into an apically-pointed lobe above the middle coxa. The cephalic lobe varies somewhat in relative width according to the species, and its surface is smooth and sparsely punctured and hairy, but it has been almost completely ignored in specific descriptions, the references to punctuation and areolation concerning the hinder lobe only. This lobe has the disk shining and sparsely punctured and hairy, the whole margin more or less strongly crenulate, and anywhere from the narrow lower margin to the lower two-thirds of its surface roughened and irregularly areolate. The metasternum is hidden by the enlarged hind coxae.

The propodeum is nearly horizontal above, and usually gradually rounded off behind, although sometimes the two faces meet in a sharp angle, and the hinder face is even concave in some cases. The dorsal surface is coarsely and more or less regularly areolated, the main ridges consisting of three longitudinal ones on each side, the two median meeting before and behind, sometimes curving together, sometimes forming a pair of elongate isocetes triangles with the bases together, the form of the pair varying with the species, and even somewhat in the species. The outer ridge on each side forms a boundary between the metapleurum and the propodeum. The ridge between the inner and outer ridges varies in its relative distance from the two, and is connected with them by a varying number of more or less prominent transverse ridges, while the two median ridges are usually joined by a number of prominent transverse carinae. There is a decided tendency, particularly in the males of some species, for the areolations to break down almost completely, and to leave a set of incomplete, twisted and curved, and often indistinct ridges. The surface of the propodeum is usually shining and hairy, at least on the sides, the hairs coming from obscure punctures. The depressions between the ridges are often roughened and irregularly wrinkled. The propodeal spiracle is large, oval, or oblong, placed diagonally with reference to the median line of the body, and located between the second and third longitudinal ridges on each side, usually in a shallow depression of the surface, although the spiracle itself is quite prominent by reason of the strongly elevated rim surrounding it.

*Wings.*—The wings are always darkened in the species of this genus and are usually fuliginous, with a few lighter spots as follows: In the forewings, with a lighter streak just behind the costal vein, and another just in front of the anal vein, with a small irregular area just behind the base of the stigma, and another beyond the point where the discoidal and first recurrent veins branch apart. The dark brown color of the veins is interrupted at the lower end of the transverse medial vein (nervulus), above the middle of the first recurrent

vein, at the junction of the first transverse cubital vein with the cubital vein, and at the lower end of the second transverse cubital vein. The whole surface of the wing is sparsely clothed with short, rather stout hairs, while there is a marginal fringe of stout hairs along the costal vein and the stigma. The terminal section of the cubital vein, the subdiscoidal vein (*nervus parallelus* of Szepligeti), and nearly all of the median vein are lighter in color than the rest of the veins and also appear to be much less developed. The hind wings are similar to the forewings in coloration and extent of hairiness.

I have not been able to determine with entire satisfaction the homologies of the venation according to the Comstock-Needham system, so I have used the older terms for the various veins and cells. The drawing of the wings will serve to show the arrangement of the venation, which seems to be quite constant for the genus. The first cubital and first discoidal cells are always united, although the base of the cubital vein is more or less developed; the areolet or second cubital cell is always four sided, and often approaches a parallelogram in shape, although usually the first transverse cubitus is more diagonal than the second.

*Legs.*—The legs are elongate and slender, with the hind pair distinctly but not prominently larger than the others. The coxae are roughly conical in shape, and have the plainly two-segmented trochanters attached to their extremities. The femora are elongate, somewhat swollen for much of their length, gradually narrowed at each end. The tibiae are quite slender for a short distance beyond their attachment to the femora, and are then gradually swollen and enlarged for the remainder of their length, being nearly as thick as the femora at their apex. The fore tibiae appear to be without apical spines, but the middle and hind tibiae nearly always have a variable number of small stout spines at their apex, forming a group or cluster above the outer and smaller terminal tibial spur. The middle and hind tibiae have two spurs at their apex, the larger about half the length of the first tarsal segment and the smaller slightly shorter. These tibial spurs appear to be light colored in all of the species. The fore tibiae have a single apical spur, modified with the base of the first tarsal segment into an antennal comb. The first tarsal segment is about as long as the next three united, and in the hind tarsi is almost as long as all the remaining segments united. The tarsal claws are large, and in all the members of this genus the first two pairs are deeply and distinctly cleft, with the inner tooth flat and much larger than the outer. The hind tarsal claws vary from cleft to prominently toothed at the base. All of the legs are more or less hairy, the coxae and femora smooth and shining, sparsely punctate and hairy, the tibiae much more closely punctured and hairy and somewhat roughened by the punctures, the tarsi thickly clothed with stout hairs, especially beneath.

*Abdomen.*—The abdomen is elongate, slender, lanceolate, with the first two segments dorsally flattened, margined along their sides, and strongly compressed below, the remainder rounded above, and tapering to the apex. If the fused second and third tergites be considered as two segments, there are eight dorsal segments in the female and six ventral, while the male has seven segments both dorsally and ventrally. The tergum of the first segment is narrow at its attachment to the propodeum between the hind coxae, and gradually widens to the apex. There is a median basal excavation and the sides are usually widened slightly at the spiracles which are located much nearer to the base than to the apex of the first segment. The tergites of the second and third segments are firmly united, the division between them at most taking the form of a very shallow faint transverse groove. The sides of these segments are also constricted to form a sharp margin for the tergite to a point slightly beyond the actual termination of the second segment. On the sides the suture between these two segments shows distinctly. The spiracles of the abdomen except the first are located on the sides of the segments, and all of them are small and round. There is a transverse fringe of relatively long upright hairs just before the caudal margin of all of the segments from the third on. The abdomen terminates in the ovipositor in the female, this consisting of a pair of closely locked valves forming an elongate, slender, linear tube approaching the abdomen in length, which is always pale red in color, pointed at the tip, and normally hidden by a pair of black sheaths, both of which are fully as long and are very slightly swollen at the tips, while they are strongly concave within and are sparsely clothed externally with rather stout hairs. The copulatory appendages of the male consist of three roughly triangular lobes, the median, dorsal one with a sharp median longitudinal ridge below, while the other two ventral lobes are flap-like. An examination of these lobes in the males of three widely separated species of the subfamily Agathinae failed to show any differences that appeared to be of value for even specific identification, so no further attempt was made to study the genitalia.

*Pubescence.*—All of the hairs of the body proper—that is, the head, thorax, and abdomen—seem to be light colored and often whitish. Their appearance is somewhat deceptive at times, however, as they are often translucent, and appear to take on the color or shade of the background against which they stand.

#### MEASUREMENTS.

With the exception of the sets of measurements given for the head, all of the lengths, as of the body, wings, etc., are given in millimeters. The head measurements were made with a micrometer eyepiece, with a scale 5 mm. in actual length and divided into 50 units, inserted in the right tube of a Zeiss binocular microscope.

The Zeiss eyepiece 4 and objective  $A_3$  were used, giving a magnification of 65X. As these head measurements are at best merely relative, it was not thought worth while to reduce them to actual fractions of a millimeter.

#### ECONOMIC IMPORTANCE.

There are breeding and host records for only one of the American species of this genus. *Bracon vulgaris* (Cresson) has been reported as a parasite of the sugar-beet web-worm, *Loxostege sticticalis* Linnaeus, both by Dr. L. O. Howard of the Bureau of Entomology, United States Department of Agriculture,<sup>1</sup> and by Prof. C. P. Gillette, of the Colorado Experiment Station.<sup>2</sup>

#### SPECIFIC NAMES.

Although I am personally strongly opposed to such a policy, I have taken the names of several of the new species from those of various entomologists, since the transferal of the genus name *Bracon* to this group of species has brought into consideration over 800 valid specific names, and has practically eliminated the possibility of choosing a descriptive name somewhat characteristic of the insect which has not already been used for some species credited to the genus *Bracon*.

#### KEY TO THE SPECIES OF THE GENUS *BRACON FABRICIUS* (CREMNOPS OF FÜRSTER AND AUTHORS).

- a*<sup>1</sup>. Apical pits of the pronotum united, and forming a deep transverse groove across the apex of the pronotum.....*slossonae*, new species.
- a*<sup>2</sup>. Apical pits of the pronotum separated.
- b*<sup>1</sup>. Apex of the antennal scape produced into a short tooth in front; body red, venter black, propodeum red in female, black in male; hind tibiae with a cluster of about 15 apical spines.....*vulgaris* (Cresson.)
- b*<sup>2</sup>. Apical margin of the antennal scape rounded off, not produced into a point.
- c*<sup>1</sup>. Hind angles of the mesoscutum produced into a finger like lobe on each side of the scutellum; black, abdomen red, propodeum variable; hind tibiae with 2 apical spines.....*comstocki*, new species.
- c*<sup>2</sup>. Hind angles of the mesoscutum at most produced into a vertically compressed rounded lobe.
- d*<sup>1</sup>. Head and all of the thorax in front of the metathorax black.
- e*<sup>1</sup>. Propodeum and metathorax red.....*montrealensis*, new species.
- e*<sup>2</sup>. Propodeum and metathorax black.....*ashmeadi*, new species.
- d*<sup>2</sup>. At least the dorsum and part of the sides of the mesothorax red.
- f*<sup>1</sup>. Thorax and propodeum black, except the dorsum and a portion of the mesopleurae and metapleurae; hind tibiae with two apical spines.....*kelloggii*, new species.
- f*<sup>2</sup>. Thorax red, at most the prothorax and venter black.
- g*<sup>1</sup>. Mesopleural furrow long, crenulate, curved upwards till its end is almost parallel with the suture between the meso- and metapleurum; propodeum black, the sides dull red; hind tibiae with an apical cluster of about 17 spines.  
*californicus*, new species.

<sup>1</sup> Insect Life, vol. 6, 1894, p. 371, fig. 30.

<sup>2</sup> Colo. Agr. Exp. Sta. Bull. 98, 1905, p. 10, pl. 1, fig. 8.

- g*<sup>2</sup>. Mesopleural furrow much shorter and straight, nearly horizontal.
- h*<sup>1</sup>. Malar space at least slightly longer than the height of the eyes.
- i*<sup>1</sup>. Tegulae and venter of female black; male not known; hind tibiae with an apical cluster of 8-10 stout spines, middle tibiae with 3-4 apical spines.  
*nigrosternum*, new species.
- i*<sup>2</sup>. Tegulae of both sexes and venter of female pale; hind tibiae with 4-7 apical spines, middle tibiae with 2, rarely 3, spines at apex,  
*szepligetii*, new species.
- h*<sup>2</sup>. Malar space shorter than the height of the eyes.
- j*<sup>1</sup>. Labrum narrow, the sides nearly straight and parallel for a short distance; middle tibiae with 1-2, hind tibiae with 2 apical spines,  
*melanoptera* (Ashmead.)
- j*<sup>2</sup>. Labrum broader, the sides curved.
- k*<sup>1</sup>. Mouthparts black or blackish; head and trochanters typically black or blackish; hind tibiae with from 2-13 apical spines, middle tibiae with 2 spines at apex,  
*haematodes* (Brullé.)
- k*<sup>2</sup>. Beak wholly red, thorax including the tegulae wholly red; hind tibiae with 2 apical spines, middle tibiae with 1, often 2 spines at apex.  
*virginiensis*, new species.

**BRACON SLOSSONAE, new species.**

Plate 25, fig. 6; plate 27, figs. 13, 14.

Apical pits of the pronotum joined together and forming a broad transverse groove across the apex; size large; black, the propodeum, metathorax, and episternum of the mesothorax, abdomen, hind coxae and femora clear red; middle tibiae without spines at apex, hind tibiae with two apical spines. Length, 11 mm.

**FEMALE.**—*Head.*—Triangular, not quite as wide as long; length, 80; width, 73; height of eyes, 35; malar space, 32; width between eyes, 37; width at bottom of head, 25; head very thick as viewed from the side, profile of the face strongly bulging from the bottom to the insertion of the antennae, and the head projecting backwards to form a strongly arched lobe behind each eye; marginal ridges of the antennal pits prominent along the sides and below, but nearly obsolete from opposite the median ocellus to the bases of the paired ocelli; interantennal plates not sharply separated and not very prominent; the clypeal foveae small, round, located in a shallow, flat depression, and nearer to the eyes than to the bases of the mandibles; head shining, more or less densely clothed with whitish hairs, each inserted in a puncture, face and cheeks less shining and more closely punctured, vertex and occiput shining and smooth except for a small group of punctures behind each lateral ocellus; eyes

oval, the outline flattened behind and bulging in front, black; ocelli arranged in a triangle with the lateral ocelli nearer to each other than to the median ocellus; antennae about two-thirds the length of the body, stout, black, 42-segmented, thickest at segments 2-6, and gradually and uniformly tapering to the tip, scape short, broad and flattened; scape and second segment shining and sparsely punctured and black-hairy, the rest dull; labrum broad oval in outline, nearly circular, strongly arched transversely and straight in profile, black, sparsely punctured and hairy, the lower margin not elevated to form a marginal ridge; mandibles black; beak rather short, black, the labial lobes pale yellowish; maxillary and labial palpi black, with scattered whitish hairs, the first two segments of the maxillary palpi much thicker than the rest, and cylindrical, the third more slender and somewhat clavate, the fourth still more slender and clavate, the last relatively very slender and nearly cylindrical; the segments of the labial palpi much shorter, the first stout, cylindrical, the second stout, a little clavate, the third more slender, clavate, the fourth slender, nearly cylindrical; the last segments of both pairs of palpi translucent.

*Thorax*.—Black, the metathorax, mesepisterna and propodeum red; lateral lobes of the pronotum shining, lightly punctate and hairy along the upper margin, the hairs blackish; a deep transverse groove cutting across the apex of the pronotum, the front margin of this elevated to form a sharp ridge, slightly notched in the middle (pl. 27, fig. 13, 14), proepisterna thickly clothed with whitish hairs, giving a silvery appearance in some lights, this appearance most pronounced in two spots just below the attachment of the head; parapsidal furrows deep, rather broad, not punctured, widened in front, and the two meeting behind in a wide curved angle just before the scutellar fossa; the middle lobe of the mesothorax with a distinct median groove, the lateral lobes with a less prominent flattened groove down the middle of each; all the lobes shining and very sparsely punctured and set with dark hairs, the punctures thickest along the inner edges of the lateral lobes; hind angles of the mesoscutum not strongly produced; the transverse fossa preceding the scutellum broad and deep, with one prominent median longitudinal carina bisecting it, and sometimes with faint traces of smaller carinae on each side of the median carina; scutellum short, broadly triangular, with the hind margin rounded and strongly depressed, then followed by a short transverse ridge; mesopleurae shining, sparsely punctured, and hairy, more closely so along the front margin; mesopleural groove nearly obsolete, represented only by a broad depression in front of the middle coxae, the deep pit occurring above this groove in most species represented by a short groove with flattened sides; front edge of the venter produced into a prominent ridge notched in the middle, and

tapering out on the sides; venter shining, more thickly punctured and hairy than the pleurae; metanotum with a small, transverse, almost triangular arched plate in its middle, followed by a very short longitudinal ridge; metapleurae strongly crenulate around the borders, except in front, with a prominent ridge above the insertion of the hind coxae, this ridge meeting the outside ridge of the propodeum above to form a blunt tooth; most of the surface of the metapleurae shining and sparsely punctured and hairy, the lower border duller and coarsely rugose; propodeum in profile nearly horizontal above, the hinder face very sharply declivious, almost vertical, the two faces forming almost a right angle, coarsely areolate, with three well-defined longitudinal ridges on each side, the two median forming an elongate isocetes triangle with its apex pointing forward, and with about 7 transverse ridges between the two; the spaces between the first and second and the second and third ridges on each side coarsely and more or less regularly wrinkled; spiracles elliptical, almost slit-like, the inner side more flattened than the outer.

*Wings.*—Length, fore 10.5 mm., hind 8 mm.; very dark fuliginous, with a pale streak behind the costa and another in front of the anal nervure, with a translucent spot immediately below the base of the stigma, another just beyond the branching of the discoidal and the first recurrent nervure, and the usual breaks in the cubital veins; venation typical of the genus.

*Legs.*—Fore and middle legs black, hind coxae and femora red, hind trochanters red with a blackish tinge, hind tibiae dark, almost black at base, dark red near the middle, and black at apex, hind tarsi black; all tibial spurs lighter at tip; apical segments of fore and middle tarsi lighter, dark reddish-brown; all tarsal claws cleft; middle tibiae without spines on the outer surface near the apex; hind tibiae with two apical spines above the smaller apical spur.

*Abdomen.*—Elongate, shining, red, sometimes irregularly blotched with blackish infusion; length, 5.5 mm.; spiracles of the first abdominal segment placed on small tubercles; ovipositor pale red, the sheaths black, length 3 mm.

*Male.*—Not known.

This species is described from two female specimens, collected at "Biscay Bay, Fla.," presumably by Mrs. A. T. Slosson, as Ashmead has given the specimens the manuscript name used above. These specimens, the type and paratype, Cat. No. 20476, are deposited in the collection of the United States National Museum.

The species is very distinct, and departs in many ways from the typical *Bracon*.



## BRACON VULGARIS (Cresson).

Plate 24, figs. 1a, 1b, 1c; plate 25, figs. 2-6, 7; plate 26, figs. 8-12; plate 27, figs. 15-18, 20.

*Agathis vulgaris* CRESSON, Proc. Ent. Soc. Phila., vol. 4, 1865, p. 295; Trans. Amer. Ent. Soc., vol. 4, 1872, p. 182; Cat. Hym. N. A., Suppl. vol., Trans. Amer. Ent. Soc., 1887, p. 227.—SMITH, List of the Insects of New Jersey, 1909, p. 609.

*Agathis media* CRESSON, Proc. Ent. Soc. Phila., vol. 4, 1865, p. 295.—VIERECK, Trans. Kansas Acad. Sci., 1905, p. 277.

*Agathis exoratus* CRESSON, Trans. Amer. Ent. Soc., vol. 4, 1872, p. 182.—SMITH, List of the Insects of New Jersey, 1909, p. 609.

*Cremnops vulgaris* ASHMEAD, Colo. Biol. Assn. Bull. 1, 1890, p. 41.—HOWARD, Insect Life, vol. 6, 1894, p. 371, fig. 30.—DALLA TORRE, Cat. Hym., vol. 4, 1898, p. 183.—BRIDWELL, Proc. Kansas Acad. Sci., Dec. 30, 1898, p. 205.—CHITTENDEN, U. S. Dept. Agr. Bur. Ent. Bull. 43, 1903, p. 39.—SZEPLIGETI, Gen. Ins., Fasc. 22, 1904, p. 124.—GILLETTE, Colo. Exp. Sta. Bull. 98, 1905, p. 10.

*Diosphyrus vulgaris* MARSH, U. S. Dept. Agr. Bur. Ent. Bull. 109, pt. 6, 1912, p. 62.

Upper margin of the antennal scape drawn out in front into a small tooth; color mostly red, orange-yellow or honey-yellow; head more or less black on the cheeks, venter black, propodeum black in the male. Length, averaging about 8 mm., but varying from 6.5 to 9.5 mm.

FEMALE.—*Head*.—Triangular, slightly longer than wide; length, 61; width, 58; height of eyes, 27; malar space, 29; width between eyes, 32; width at bottom of head, 19; all these taken from an average size specimen; interantennal plates usually distinct, triangular in form, and separated by a more or less developed groove, which is generally triangular in shape; height and distinctness of the plates varying considerably in a large series of specimens; ridges bordering the antennal fossae distinct and strongly arched opposite the lower border of the median ocellus, continuous to the lateral ocelli; profile nearly straight, very slightly concave from the apex of the clypeus to the lower end of the flattened area; the whole face in section strongly arched transversely along the median line; the flattened area varying greatly in extent, and sometimes hardly evident, its median groove also varying in depth and length; face on flattened area sparsely and not heavily punctured, sides, lower end, and malar spaces highly shining and at most very sparsely punctate and hairy; head red, mouth parts and a portion of the cheeks black; eyes medium in size, usually dark; ocelli variable in color, arranged in a triangle with the lateral ocelli nearer to the median ocellus than to each other; antennae 35-36 segmented (from 20 specimens), black, except that the lower part of the scape up to four-fifths of it may be red like the head, leaving only an apical black band; scape not particularly

swollen, the upper margin distinctly, but sometimes not prominently drawn upward and forward in front to form a short obtusely angled tooth; labrum black or blackish, shining, sparsely punctate and hairy, longer than wide; mandibles pale, apex black; beak black.

*Thorax.*—Longer than high, red, the venter black; lateral lobes of pronotum shining, closely punctate along the upper border, disk very sparsely and faintly punctate, apical pits deep and distinct; propisterna rather coarsely and roughly punctured, shining, the apical lobes smooth, only slightly expanded and somewhat blackish; parapsidal furrows distinct, not so very deep, although this varies, typically, at least, distinctly and even rather coarsely crenulate for their whole length, even to the junction before the scutellar fossa, continued to the scutellar fossa as a shallow groove, sometimes almost obsolete; median furrow of the middle lobe distinct but usually rather shallow, the two lateral lobes flattened over part of their surface; the whole mesonotum shining and mostly smooth, very sparsely punctured and hairy; scutellar fossa more shallow than in some other species, the front wall sloping to the mesonotum, with at least a large median carina longitudinal to the body, and with traces of several others on each side of the middle one, these sometimes almost as prominent as the median ridge; scutellum triangular, the sides and apex rounded off; hind angles of the mesoscutum not prominently produced; mesopleurae shining, distinctly punctured and hairy; mesopleural groove rather deep, curving lightly upwards, coarsely crenulate; venter distinctly and rather closely punctured and hairy, black; metapleurae smooth and rather closely punctured above, more coarsely, closely, and roughly punctured below, shining; propodeum with six longitudinal ridges, the two median nearly or quite parallel for much of their length, converging suddenly in front, and very gradually behind, connected by a varying number of transverse ridges, and united with the lateral ridges on each side by a number of transverse ridges; in many specimens there is exhibited a tendency toward the formation of a fourth ridge on each side between the median and second ones; spiracles oval, but varying somewhat in shape.

*Wings.*—Length, average, fore 7.5 mm., hind 5.5 mm.; fuliginous, venation as shown in figure.

*Legs.*—Reddish, the trochanters black or blackish, more or less of the fore and middle femora dark, extreme tips of hind femora, bases, and apices of hind tibiae black, as are more or less of the extreme tips of the middle tibiae, fore tarsi pale, middle tarsi blackish except the bases, hind tarsi black; all tarsal claws black, fore and middle cleft, hind large-toothed at base.

*Abdomen.*—Elongate, lanceolate, slender, the first segment not extremely long and narrow, the remainder as described for the genus, sometimes more or less clouded irregularly with blackish infusion,

although usually clear red, or orange-red; length, average, about 3.75 mm., ovipositor pale red, valves blackish, about as long, or when fully retracted, a little shorter than the abdomen.

**MALE.**—Appears to resemble the female rather closely, except as follows: Head usually with considerably more black on the cheeks, and with the apex of the vertex around and between the ocelli black; propodeum and usually the metathorax black, more or less of the metapleuræ often paler; generally all of the hind tibiae except a rather narrow band above the middle black or blackish; the distinct carinae of the propodeum often broken down, incomplete, irregular, not following the usual lines, curving and swirling.

Over 350 specimens of this species have been more or less carefully examined, although the detailed description was made up from not more than a score, selected from widely separated localities. By far the greatest number of specimens were collected in the State of Colorado, including about 130 collected in two hours' time by the writer near Eaton, Colorado, the latter part of August, 1914, and there are a sufficient number of specimens in the collection to show that the species also has a wide distribution in New Mexico, Arizona, Texas, and at least the western part of Kansas. In addition there are isolated records from West Point, Nebraska; Pierre, South Dakota; Mount Hood, Oregon; Milwaukee, Wisconsin; and, 12 specimens from the C. F. Baker collection labeled "Ind.," which I assume to refer to Indiana, although in general summer collecting over the State for several years past I have not come across this species. There is also a single specimen of this species in the collection labeled "near Phila."

The type of the species is located in the collection of the Academy of Natural Sciences in Philadelphia, there being a number of cotypes, without any designated type.

**BRACON COMSTOCKI, new species.**

Hind angles of mesoscutum produced into relatively prominent, tapering, slightly curved finger-like projections on each side of the scutellum; at least the head and mesothorax black, and the abdomen red; metathorax, propodeum and legs variable in color; length 6.5–8 mm.

**FEMALE.**—*Head.*—Triangular; height, 53; width, 56; height of eyes, 26; malar space, 26; width between eyes, 32; width at bottom of head, 20; interantennal plates triangular in outline, separated by a triangular groove; face triangularly flattened below the antennae, this area grooved down the middle, this groove deepest and its flattened sides widest at the top; ridges surrounding the antennal fossae not especially prominent, highest before a point opposite the median ocellus, obsolete shortly before meeting the lateral ocelli; profile of face slightly

convex, the face bulging more in front of the eyes than in most species; face rather closely punctured and hairy along the middle line, less closely and more finely so below on the clypeus and on the cheeks, faintly longitudinally striate or wrinkled near the center; head black, end of clypeus sometimes slightly very dark reddish; compound eyes dark, size medium; ocelli dark, the lateral ocelli slightly but distinctly nearer to each other than to the median ocellus; antennae 43-45 segmented, the last segment sometimes indistinctly separated from the preceding, black except in imperfectly colored specimens, which are brownish black, the first two segments shining; labrum broader than long, black, with an indistinct paler band across the lower margin, sparsely punctate and hairy; mandibles black or dark; beak black or blackish; palpi with the last three segments of both translucent, dirty yellow, the basal segments blackish, all of the segments of the maxillary palpi nearly cylindrical, those of the labial palpi rather clavate, except the last; maxillary palpi about twice as long as labial.

*Thorax.*—Longer than high, black, often with more or less of the propodeum, metathorax, and legs red; lateral lobes of pronotum shining, nearly smooth in center, rather coarsely punctate and hairy around the borders, with the grooves paralleling the hind margins deeply crenulate but poorly defined; with the surface just below the apical pits vertically wrinkled, and the whole surface often more or less roughened; proepisterna less densely punctate and hairy than in many of the other species; pits at apex of the pronotum deep and large, but not produced very far downward on the sides; mesonotum shining, rather sparsely punctured and hairy; parapsidal furrows straight, fairly sharp and deep, meeting behind to form a sharp, shallow angle and continuing to the scutellar fossa as a single groove; typically shallowly crenulate, at least about their middle, but these crenulations apparently sometimes wanting in some specimens; median lobe of mesonotum shallowly excavated along middle line; lateral lobes also shallowly grooved down their middle; hind angles of mesoscutum strongly produced as already described; scutellar fossa deep and broad, with one prominent median longitudinal carina bisecting it, and with one or two smaller often indistinct carinae in each half; scutellum broadly triangular in outline, with the sides and apex strongly rounded off, so the shape is almost that of a parabola; the whole disk of the mesopleurae uniformly punctured, the venter a little more densely hairy; length of mesopleural furrow about half the width of the pleurae, the furrow deep and more sharply defined above, and directed diagonally upwards; metapleurae black or red, the lower two-thirds roughened and irregularly areolate, the upper third smoother and punctured; propodeum coarsely areolate, the median ridges converging slightly toward the front, and then meeting suddenly; spiracles elongate oval.

*Wings*.—Dark fuliginous, venation normal, the second transverse cubital vein occasionally with a spur running out from above its middle

*Legs*.—Fore and middle legs black, hind trochanters, tarsi, and at least the apices of the tibiae black; coxae, femora, and portions of the tibiae black or red; all of the tarsal claws cleft, the hind more deeply and broadly than the others; middle tibiae with one apical spine, hind tibiae with two apical spines above the smaller spur, in a single specimen with one apical spine present.

*Abdomen*.—Elongate slender, wholly red, the first segment rather broadly triangular; the tergum of segments two and three with an obscure transverse groove to indicate the division between the two, and with a low transverse hump across the base of the second tergite; length about 3.5 mm.; ovipositor red, sheaths black, length 2 mm.

Described from 12 females.

**MALE**.—Apparently resembles the female in all essential structural characters, except that the number of antennal segments varies from 40–42.

This species appears, so far as the specimens examined may be used as an indication, to occur in four distinct color varieties, which are more or less definitely limited in distribution. I have been unable to find any structural characters which would separate these groups of specimens, and I believe that a larger series would show complete intergradation, so I have merely tabulated these color variations as follows:

- |   |                 |
|---|-----------------|
| $a^1$ . All the legs wholly black.....  | Var. <i>A</i> . |
| $a^2$ . Hind legs except the trochanters, tarsi and ends of tibiae, red.                  |                 |
| $b^1$ . Propodeum and thorax wholly black.....  | Var. <i>B</i> . |
| $b^2$ . Propodeum and metapleurae at least partly red.                                    |                 |
| $c^1$ . Propodeum and metapleurae wholly red .....  | Var. <i>C</i> . |
| $c^2$ . Propodeum blackish in front; metapleurae almost wholly black<br>or blackish ..... | Var. <i>D</i> . |

Var. *A* is represented by 5 specimens; 1 female from Freeville, New York, in July; 1 from Ithaca-Ellis, New York, in June; 1 female and 1 male from Princeton, Maine, July 12; another male without data.

Var. *B* is represented by 10 specimens; 1 female from New York; 1 female from Great Falls, Virginia, June 20; 1 female from Roberts, Pennsylvania, July 4; 1 female from Agricultural College, Michigan, July 6; 1 female from Enola, Pennsylvania, September 18; 3 females and 1 male from Inglenook, Pennsylvania, June 20.

Var. *C* is represented by 5 specimens; 3 females from Dallas, Texas, May 1 to October 7, the latter from Polygonum; 1 male from Paris, Texas, August 27; and 1 male from Mound City, Louisiana, April 2.

Var. *D* is represented by 2 females; 1 from Falls Church, Virginia, June 19; and the other from Glencarlyn, Virginia, June 30.

*Type*.—Cat. No. 20477 U.S.N.M.

## BRACON MONTREALENSIS, new species.

*Agathis liberator* PROVANCHER, Le Nat. Can., vol. 12, 1880, p. 176.

*Agathis semirubra* SMITH, List of the Insects of New Jersey, 1909, p. 609.

*Cremnops semirubra* BANKS, Ent. News, vol. 23, 1912, p. 108.

Black, apical border of labrum pale; metathorax, propodeum, and abdomen red; length, 6-8 mm.

**FEMALE.**—*Head.*—Triangular, dimensions of typical specimens as follows: Height, 56; width, 62; height of eye, 30; malar space, 25; width between eyes, 33; width at bottom of head, 19; interantennal plates triangular in outline, separated by a triangular groove, and with a median groove running for a short distance down the face; profile of face nearly straight on the clypeus, slightly emarginate opposite the clypeal foveae, then slightly bulging to the flattened area below the antennae; ridges surrounding the antennal fossae rather prominent, arched, highest opposite the median ocellus and continuous to the lateral ocelli; head black, sometimes paler behind the eyes; face shining, fairly closely punctured and hairy in the middle, more lightly but nearly as closely punctured on the sides and below; compound eyes relatively large, dark; ocelli pale, the lateral ocelli typically slightly nearer to the median ocellus than to each other, although this appears to vary; antennae 39-40 segmented, black, the first two segments smooth and shining; labrum black, lower border pale tawny, wider than long, sparsely punctate and hairy; mandibles black, beak black, margins of lobes paler, palpi black, or blackish, maxillary palpi less than twice as long as labial.

*Thorax.*—Longer than high, black; metathorax and propodeum red; lateral lobes of pronotum smooth and shiny, sparsely and finely punctate and hairy around the edges, the pits deep and broad, propisterna closely punctured and hairy, the apical lobes highly polished and broader than in most species, being produced laterally; mesonotum shining, fairly smooth, sparsely punctured and hairy; parapsidal furrows straight, well defined, crenulate, sometimes obscurely, the side walls flattening out behind; longitudinal groove of the median lobe relatively deep and narrow, lateral lobes flattened over much of their surface, hind angles of the thorax slightly produced into a broadly rounded vertically compressed plate, scutellar fossae transversely broad and deep, with a prominent median longitudinal carina and one or more very indistinct lateral carinae on each side of the median carina; scutellum triangular, rounded off behind and on the sides, punctured and shining; mesopleurae shining, sparsely punctured and hairy over the whole disk, more densely so below and on the venter; mesopleural furrow deep, and very coarsely crenulate, longer than half of the width of the pleurae, not quite horizontal, metapleurae shining, roughened only along the lower margin, sparsely punctured and hairy over the whole surface; propodeum strongly areolate, the

median longitudinal carinae converging steadily from behind forwards, and united by a number of prominent transverse carinae; spiracles oval, the propodeum somewhat excavated behind them.

*Wings*.—Dark fuliginous, venation normal, sometimes with traces of a spur running out from the second transverse cubitus; length, fore 8 mm., hind, 6.5 mm.

*Legs*.—Fore and middle legs black, hind legs red except the basal segment of the trochanters, the tarsi and the bases and apices of the tibiae. Fore and middle tarsal claws cleft, hind long-toothed; hind tibiae with two short, blunt spines outside at the apex.

*Abdomen*.—Length, of 8 mm. specimen, 4 mm.; bright red, elongate, slender, lanceolate, the first segment relatively stout, second segment with a faint semicircular elevation at the base, the depression indicating the division between the second and third tergites very indistinct; ovipositor red, sheaths black, length 3.5 mm.

**MALE**.—Appears to resemble the female in all essential structural characters, including the number of antennal segments, although the antennae are sometimes as low as 37-segmented; with a varying amount of blackish diffusion over the dorsum of the abdomen in some species, this near the middle or apex. Described from 29 females and 37 males whose collection records show that the species is common from Montreal, Canada, to Virginia, along the Atlantic coast, and through New York and Pennsylvania westward to Michigan and Illinois, while there are isolated records from "S. D." (South Dakota), Milwaukee, Wisconsin, Pyziton, Alabama, and Texas (Belfrage coll.).

I have found this species labeled as *Agathis* or *Cremnops semi-rubra* Brullé in some collections, but it is obviously not that species, the matter of length alone precluding such a possibility, as *semi-rubra* is given as being 11 mm. long.

*Type*.—Cat. No. 20483 U.S.N.M.

**BRACON KELLOGGII, new species.**

Size small, length 5½–6 mm. black, dorsum and a little of the upper half of mesopleurae and metapleurae, hind coxae and femora, and abdomen, yellow-orange.

**FEMALE**.—*Head*.—Triangular, slightly higher than wide; length, 43+; width, 42.5; height of eye, 20+; malar space, 18; width between eyes, 25.5; width at bottom of face, 15; profile of face made up of two very slight curves, the first running from the base of the labrum to opposite the clypeal foveae, the second curve running from here to between the antennae; face with a short groove, deeper above, between the antennal plates; antennal plates distinctly separated, but not very high or large; the ridge of the antennal fossae almost uniform in height, a very little higher opposite the median ocellus, continuous to the lateral ocelli; head black, shining, rather

closely punctate and hairy, the hairs tawny; ocelli equidistant from each other; antennae black, the scape and first flagellar segment shining, the rest dull, more than 30-segmented (broken); labrum broad for the genus, almost semicircular in outline, black, slightly less punctate and hairy than the face; mandibles curved at tip, bidentate, the inner tooth short, the outer much longer and curved, black, beak black, the basal segments of both palpi only slightly thicker than those following, all the segments except the last tending toward a clavate shape, the last nearly cylindrical, tapering slightly at each end.

*Thorax.*—Black, caudal half of lateral lobes of pronotum, mesoscutum, a large portion of the middle of the mesopleurae, base of scutellum and upper half of metapleurae red; dorsum and cephalic half of the pronotum black, this shining, finely punctate around its borders, the pits rather large and pointed below, the front borders of the pits straight, the diagonal depression highly polished and smooth; proepisterna black, only slightly shining, more coarsely and closely punctate and hairy; parapsidal furrows of the mesonotum distinct and rather sharply defined, the median lobe divided by a narrow shallow longitudinal groove, the two halves flattened a little; the two lateral lobes only slightly flattened; hind angles of the mesoscutum only slightly produced; fossa of the scutellum not very deep, with only the median carina distinct, profile of scutellum evenly curved to tip which is lightly elevated, sides uniformly rounded off, triangular in shape with the tip truncate; mesopleurae smooth, shining, sparsely and faintly punctate and hairy, the front border and all of the lower half black, the remainder red; venter black, tegulae black; pleurae bulging somewhat above the furrow, this straight, horizontal, well defined and crenulate, and in length less than half the width of the pleurae; metathorax black, the upper third of the pleurae reddish; metapleurae smooth, shining, slightly more sparsely and coarsely punctate and hairy than are the mesopleurae, the lower hind corner roughened; propodeum black, with six longitudinal keels, the two median converging uniformly in front to form an elongate triangle, and meeting behind in a much sharper angle, with only one distinct transverse carina, which forms the base of the triangles; profile gently rounded above, but with the caudal face slightly distinct from the general outline; spiracles oval.

*Wings.*—Infuscated, venation typical, the second cubital cell trapezoidal; fore wing, 5 mm.; hind wing, 4 mm.

*Legs.*—Fore and middle coxae, trochanters, and femora black, the tibiae dark and with a strong blackish tinge; fore tarsi paler reddish, tarsal claws black, middle tarsi same color as tibiae, claws black; hind coxae red, black beneath and behind, trochanters black, femora honey-yellow, tips and all of tibiae and tarsi dark reddish brown,



almost blackish; fore and middle claws deeply cleft, hind, toothed; with 1-2 spines at apex of middle tibiae, and with three apical spines at end of hind tibiae.

*Abdomen*.—Three mm. long, honey-yellow, most of the first two segments darker, the sides and dorsum of the first segment blackish to behind the spiracles, the first segment relatively broad at its apex in comparison to its length, not flattened but gradually elevated caudally till near the hind margin, then rather sharply rounded off; the fossa at its attachment to the propodeum broad, deep, and relatively long, the sides parallel for a little distance; the spiracles set on small protuberances; ovipositor yellow, sheaths dark reddish brown, length, 3 mm.

*MALE*.—The male closely resembles the female except in the following characteristics: Color: With the exception of a little along the upper border of the lobes of the pronotum and on the upper third of the front part of the mesopleurae, there is no light color on the pleurae, while the abdomen is uniform reddish-yellow in color: Structure: The profile of the face is different, the sides of the labrum more nearly angulate, the groove running downward from between the antennal plates is very short and the whole middle of the face is slightly depressed below the end of the groove; the mesopleural furrow is a little longer, and runs upward instead of horizontally; the transverse carinae connecting the longitudinal ridges of the propodeum are more irregular and less distinct than in the female.

Described from two specimens, 1 female and 1 male, labeled "Nev." and from the collection of the American Entomological Society, but in the possession of the United States National Museum. This species was given the manuscript name of *discoidea* by Ashmead.

*Type*.—Cat. No. 20478 U.S.N.M.

**BRACON ASHMEADI, new species.**

Size rather small for the genus, length 6 mm., black, abdomen red, hind angles of metathorax produced into a rather prominent vertically compressed lobe.

*FEMALE*.—*Head*.—Triangular, slightly wider than high; height, 49; width, 51; height of eye, 26; malar space, 20; width between eyes, 26; width at bottom of head, 16; interantennal plates distinctly separated; face below these triangularly flattened for one-third of its length and with a median groove from the interantennal plates dividing most of its length; ridges around the antennal fossae not very prominent, highest opposite or a little behind the middle of the median ocellus, continuous to the lateral ocelli, or slightly obsolete, just before reaching them; profile of face nearly straight below the flattened area; face rather closely punctured and hairy in the middle just below the antennae, more sparsely and finely punctate

on the clypeus and on the sides; face shining, the depressions on either side above the antennae highly polished, not punctured; head black, palpi tawny; compound eyes relatively large, dark; ocelli pale, almost equidistant from each other; antennae 35-segmented, black, the first segments shining, the rest dull, largest about the sixth segment, from there gradually tapering towards the tip; labrum about as long as wide, black, the lower margin tawny, coarsely, sparsely, and irregularly punctured and hairy; mandibles tawny, dentate, tips black; beak rather short, black, palpi dull yellow with a blackish shade, the first two segments of the maxillary palpi distinctly larger than the rest, the segments of the labial palpi relatively short and stout, successively more slender from base to apex.

*Thorax.*—Thorax longer than high, wholly black, lateral lobes of pronotum smooth and shining in the middle, closely and finely punctate around the margins, the punctures coarser below; pits of pronotum large and with distinct marginal ridges; proepisterna closely punctured and hairy and somewhat roughened, except for the lobes above the coxal insertions, which are smooth; parapsidal furrows well defined, smooth before and behind, more or less distinctly crenulate in the middle, straight, meeting a short distance before the scutellar fossa, and continuing as a single median groove to it; median lobe grooved broadly but rather shallowly down its middle, the lateral lobes shallowly grooved longitudinally, the whole surface of the mesonotum shining, sparsely punctured and hairy; hind angles of the mesoscutum distinctly produced into a vertically compressed lobe; scutellum tapering behind, the sides and apex much rounded off, the scutellar fossa broader than usual as the front wall slopes gradually upward, with a prominent median carina and a single much smaller one dividing the two halves of the fossa; mesopleurae shining, very sparsely punctured and hairy on the disk, more closely above and on the venter; furrow about two-thirds the width of the pleurae, straight, very coarsely crenulate and almost horizontal, metapleurae shining, coarsely and sparsely punctured and hairy, the lower third roughened and irregularly areolate; propodeum areolate, the median ridges converging very gradually from behind forward, then coming together suddenly in front; spiracles elongate oval, the propodeum shallowly excavated behind them and between the two lateral ridges.

*Wings.*—Fuliginous, venation and light spotting typical, the first transverse cubitus, forming the inner side of the areolet, running more diagonally outward than usual.

*Legs.*—Entirely black, or in some lights black with a faint dull reddish tinge, the last segment of the middle and hind tarsi and tibial spurs pale; fore and middle tarsal claws cleft, hind long-toothed, almost cleft, middle tibiae with 1-2 apical spines; hind tibiae with 2-3 spines.

*Abdomen.*—Length, 3 mm.; first abdominal tergite relatively broad and stout, second tergite with an indistinct line indicating the division between the second and third segments and with a slight, poorly defined semicircular elevation across the base, the whole abdomen red without blackish infusion; ovipositor pale red, sheaths black, length 3 mm.

*MALE.*—Appears to resemble the female very closely, except that the median ridges of the propodeum converge steadily from behind forward forming an elongate isocceles triangle; while the spiracle is more truly oval than in the female.

Described from two females—one, the holotype, from "Sou. Ill." collected by Robertson, the other labeled "Minn.," and from two males, the allotype from "Ks" (Kansas) 2138, coll. C. F. Baker, the remaining paratype from Lexington, Kentucky.

*Type.*—Cat. No. 20480 U.S.N.M.

*BRACON CALIFORNICUS*, new species.

Large, fossa of mesopleurae crenulate, curved upward, toward the end almost parallel to the suture between mesopleurae and metapleurae; body honey-yellow, propodeum black, caudal portion of metapleurae black, dark dull red in the center; length, 9 mm.

*FEMALE.*—*Head.*—Triangular, wider than long; length, 64; width, 67; height of eye, 32; malar space, 30; width between eyes, 37; width at base of beak, 24; profile of face very slightly concave to a little below the eyes, then slightly concave on another angle to the apices of the interantennal plates; marginal ridges of antennal pits well developed and extending to the lateral ocelli, most prominent opposite the median ocellus, and nearly obsolete above this; interantennal plates fairly well developed; head smooth, shining, sparsely punctured and hairy, the hairs whitish; ocelli arranged in a triangle, the lateral ocelli nearer to the median than to each other, each surrounded by a somewhat circular darker area; antennae black, nearly cylindrical at the middle, but tapering toward the tips; the first and second segments shining, the rest dull, 40-segmented; labrum elongate, strongly arched transversely, pale yellow, margined by a blackish-brown line, punctate and hairy; mandibles blackish brown at base and apex, yellowish in the middle; beak black, palpi black, the first two segments of each heavier and thicker, the rest more slender; all segments of maxillary palpi slightly clavate, last almost cylindrical; segments of labial palpi stouter and more strongly clavate, except the last which is nearly cylindrical; labial palpi more than half the length of the maxillary palpi.

*Thorax.*—Elongated, honey-yellow, propodeum black, caudal half of metapleurae black, dark dull reddish in center, pronotum shining, sparsely punctate and hairy except along the edge next to the meso-

notum and along the lower front margin where it is very closely and finely punctate and hairy; the surface very faintly almost vertically rugose below the lateral pits, these pits large, with an inner and an outer ridge on the caudal side; proepisterna more closely punctured and with larger hairs, the lower end above the coxal insertions on each side with a poorly defined transverse blackish band; parapsidal furrows fairly well defined, not punctured, apparently nearly obsolete behind, median lobe grooved, lateral lobes flattened in the middle; hind angles of the mesoscutum not prominently produced; fossa between mesonotum and scutellum with a median and one or two lateral ridges on each side; scutellum elongate, triangular, apex almost truncate; mesopleurae shining, sparsely punctured and hairy, with a well-defined but not deep crenulate fossa running forward from the insertions of the meso-coxae and curving strongly upward near the end; propodeum rounded in profile with three well-defined longitudinal ridges on each side, the median pair parallel for part of their length, uniting to form an oval in front, and in the shape of an elongate truncate triangle behind, the second ridge irregular and incomplete, the third nearly straight; spiracles short, oval.

*Wings*.—Fuliginous; length, fore wing 7 mm.; hind wing, 5.5 mm.; venation typical, with a large hyaline spot below the base of the stigma and another large irregular transverse mark just beyond the branching of the discoidal and the first recurrent nervure.

*Legs*.—Honey-yellow except all the tarsal claws, the apices of the hind tibiae and the hind tarsi; fore and middle tarsal claws cleft, hind claws missing, hind tibiae with an apical cluster of about 17 short, stout spines, middle tibiae with 2 stout spines.

*Abdomen*.—Elongate, slender, sides almost parallel, 4 mm. long, shining yellow with blackish infusion near the caudal end of the dorsum of third segment and some along the under sides of the same segment; dorsum of segments two and three very long, much longer than first segment; ovipositor brownish-yellow, sheath blackish, 4 mm. long.

MALE.—Not known.

Described from one specimen labeled "Sou. Cal. Am. Ent. Soc. Coll.," but now in the United States National Museum collection.

*Type*.—Cat. No. 20481 U.S.N.M.

BRACON NIGROSTERNUM, new species.

Malar space longer than height of eyes; reddish yellow; tegulae and venter of female black; length, 7–8 mm.

FEMALE.—*Head*.—Elongate, triangular, longer than wide; height, 62–57; width, 58–54; height of eye, 28.5–25; malar space, 30–27; width between eyes, 31–31; width at base, 18–17.5; profile of face slightly curved to a little below the antennae, then with a very faint

flat tubercle and straight to the antennae; face from the end of the clypeus to the slight tubercle, strongly arched transversely, and almost triangular in section, but spreading out to form a triangular flat area below and between the antennae, this area faintly grooved down the middle; the ridges bounding the antennal pits plainly extending to the lateral ocelli, and most prominent opposite the median ocellus. Head in one specimen dark red, overspread with blackish, especially around the antennae and over the cheeks; an oval lighter spot just below the frontal tubercle, lighter below the inner lower corner of the eyes, and almost the color of the body behind the upper half of the eyes. In the second specimen the head is red, overspread with blackish, with a band, broadest at the ends, across the face opposite the lower half of the eyes and a large area behind the upper half of each eye, the color of the body; head distinctly punctate, and clothed with long whitish pile, the punctures larger below and between the antennal pits; eyes relatively rather small; ocelli arranged in a triangle with the two lateral ocelli somewhat nearer to the median than to each other; antennae about 6.5 mm. long, black, segments one and two shining, punctured and hairy, the rest dull and hairy; 36-segmented (one antenna); labrum black, shining, relatively broad, somewhat more punctured and hairy than the face; mandibles black, palpi black, all of the segments at least approximately cylindrical.

*Thorax*.—Longer than high, red; tegulae and venter black; pronotum shining, closely and finely punctate and hairy along margins, the pits above large, elongate oval, pointed below and followed by a few indistinct vertical ridges in the depression of the lateral lobes of the pronotum; reddish yellow; cephalic margin black above, in the middle, and near the lower ends of the lateral lobes; proepisterna darker, the lower ends of the lobes broadly black; mesonotum shining, rather finely and sparsely punctate and hairy, the parapsidal furrows large and deep, but broad and not sharply limited, straight, meeting just before the scutellar fossa, with a slight median depression running to the fossa; median lobe broadly grooved, the middle of the groove slightly elevated, lateral lobes broadly flattened, hind angles of mesonotum produced into nearly vertical, almost triangular plates, prescutellar fossa deep, with a large median longitudinal carina, and a much smaller incomplete one on each side; scutellum triangular, truncate behind, the sides rounded off; mesopleurae shining, sparsely punctate and hairy, the mesopleural furrow straight, length equal to about one-half the width of the pleurae; deep and strongly crenulate; venter smooth, hairy, black; upper part of metapleura smooth, shining, punctured, and hairy; lower third coarsely rugose; profile of propodeum uniformly curved to the insertion of the abdomen, with six carinae, the two median nearly parallel, converging slightly in front, meeting before and behind in a definite angle, with three trans-

verse ridges between them; the two lateral ridges on each side joined to each other and to the median by several transverse carinae; spiracle broad oval.

*Wings*.—Infuscated, darker behind and basad of the stigma, venation typical, second cubital cell trapezoidal, the second transverse cubitus in both wings of one specimen with a very short spur branching from above its middle into the third cubital cell; forewing, 7.5 mm.; hind wing, 6 mm.

*Legs*.—Fore and middle coxae and all trochanters black; hind coxae red, tips blackish, basal third of fore femora, all of middle femora, and extreme base and apex of hind femora blackish, rest reddish-yellow; fore tibiae yellow, middle and hind tibiae black, fore tarsi pale, middle and hind black, all tarsal claws black, fore and middle cleft, hind large-toothed, nearly cleft; middle tibiae with 3-4, hind tibiae with 8-10 stout apical spines.

*Abdomen*.—Elongate lanceolate, length 3.5-4 mm.; length of ovipositor, 4 mm., reddish-yellow, sometimes with internal irregular blackish diffusion above; ovipositor yellow, sheaths black; first segment elongate, rather slender, proportions, length, 3.5+; width at apex, 2.2; width at base, 1; spiracles projecting slightly on each side; dorsum of segments two and three, smooth and shining, with a broad very shallow depression just behind the base, and an indistinct transverse line separating the two segments.

*MALE*.—Not known.

Described from two female specimens, holotype from Southern Pines, North Carolina, collected by A. H. Manee, May 21, 1908, and from the collection of N. Banks, and the other from Brandtsville, Pennsylvania, July 24, 1910, collected by H. B. Kirk, and from the collection of P. R. Myers.

*Type*.—Cat. No. 20479 U.S.N.M.

**BRACON SZEPLIGETII, new species.**

Size medium, length, 6.5-8 mm., malar space slightly but distinctly greater than the height of the eyes; parapsidal furrows crenulate, red, mouth parts, antennae typically, trochanters and tips of middle and hind tibiae more or less, hind tarsi except base of first segment, blackish; abdomen often with blackish infusion.

*FEMALE*.—*Head*.—Triangular, slightly longer than wide; length, 56; width, 53; height of eye, 25; malar space, 27; width between eyes, 29; width at bottom of beak, 16; most specimens with the actual measurements greater but the proportions approximately the same; interantennal plates distinct, rather close together, a triangular area below them flattened and slightly grooved medially; ridges above the antennal pits highest opposite the median ocellus, continuous to the lateral ocelli; face in profile nearly straight to the flat-

tened area below the antennae; head smooth, shining, lightly punctate and hairy; color typically reddish honey-yellow, with the mouth parts, usually including the labrum, blackish; ocelli and eyes usually dark; ocelli arranged in a triangle, the lateral ocelli a little farther from each other than from the median ocellus; antennae 37-segmented, typically black, but brownish in imperfectly colored specimens, the base of the scape often paler, the first and second segments shining, the rest dull; labrum almost as long as wide, sides strongly curved, apex very slightly truncate, typically blackish, but colored like the head in some specimens, smooth, shining, with scattered punctures and hairs, and very finely punctate; mandibles the color of the head, the tips black, beak black; maxillary palpi a little less than twice as long as labial palpi, first segment the thickest, second the longest, cylindrical or very slightly clavate, slightly more slender than the first; last segment the most slender, tapering toward the tip, a little longer than the fourth; all segments except the last diagonally truncate at tip.

*Thorax*.—Slightly longer than high, red; pronotum with lateral lobes smooth and shining in the middle, closely and finely punctate around the margins; proepisterna closely and finely punctate and hairy, mesonotum sparsely punctured and hairy with the parapsidal furrows deep and crenulate, meeting in a sharp angle behind; median lobe somewhat flattened, with a broad shallow groove down the front two-thirds, this groove elevated longitudinally in the middle; lateral lobes flattened; hind angles of mesonotum slightly produced and flattened vertically; scutellum triangular, apex slightly rounded, sides rounded off and slightly concave, the triangular flattened area on the sides of the scutellum transversely ridged; fossa preceding scutellum deep, with one large median transverse carina and two small more or less distinct ones on each side; mesopleurae smooth, shining, sparsely punctate and hairy, the venter much more closely punctate and hairy; mesopleural furrow deep, straight, coarsely crenulate, length about two-thirds the width of the pleurae; metathorax shining, rather coarsely but sparsely punctured, rugose around the margins; median ridges of the propodeum meeting in front, typically convexly curved gradually away from each other to the hind margin of the dorsal face of the propodeum, and joined together there by a transverse ridge, sometimes suddenly separating in front and then nearly parallel for the rest of their length; the spiracle oval with the inner side flattened.

*Wings*.—Fore wing, 5.5–7 mm.; hind, 4.5–6 mm.; fuliginous, lighter spots as usual, second transverse cubitus sometimes with a spur at or near its middle.

*Legs*.—Reddish, typically with the trochanters darker to blackish; the extreme apices of the intermediate tibiae and more or less of the

bases and apices of the hind tibiae dark to blackish; fore and middle tarsi pale, except the claws; hind tarsi blackish except base of first segment; trochanters, tarsi, and tibiae sometimes wholly or in part pale; fore and middle tarsal claws cleft, hind toothed; middle tibiae with two, rarely three, apical spines, hind tibiae with from four to seven apical spines.

*Abdomen.*—3-4 mm. long, slender, first segment elongate and slightly widened toward the apex; red, nearly always with more or less blackish infusion, this usually near the apex of the abdomen, but sometimes at the apex of the first segment and on the second and third segments; ovipositor 4-5 mm. long, pale red, the sheaths black.

Described from seven females; specimens from Woods Hole, Massachusetts, to Texas, including Indiana, Florida and Kansas.

*MALE.*—Similar to the female, except for the following: Length, 7-8 mm.; color of head varying from entirely black, except for a small pale area behind each eye and a trace of a paler spot above the labrum, to entirely red, except for the mouth parts; proportions of head relatively the same as in the female; antennae 39-40 segmented, the last two segments rather indistinctly separated in the three specimens with 40-segmented antennae; parapsidal furrows apparently not crenulate in two specimens, but this seemingly due to their being partially filled with fused foreign matter; the smooth apical lobes of the proepisterna, the front coxae—at least beneath—the venter, and a band on the outer sides of the intermediate coxae blackish or black, sometimes indistinct in old faded specimens.

Described from 15 males from various parts of Texas (12), Florida (2), Falls Church, Virginia (1).

In addition to the above specimens I have included here one female and one male specimen, each labeled "Va., July 25, '80, thru C. V. Riley," which are only about 6 mm. long and are very much paler than the lightest of the above specimens, there being no blackish markings except at the apices of the hind tibiae and the hind coxae, which are darker; the antennae are brownish, and there is a little blackish infusion on the dorsum of the abdomen. Structurally these specimens seem to agree specifically with this, and they present every appearance of being poorly nourished bred specimens which were killed and pinned before the coloring had fully developed.

*Type.*—Cat No. 20482 U.S.N.M.

BRACON MELANOPTERA (Ashmead).

*Cremnops melanoptera* ASHMEAD, Proc. Calif. Acad. Sci., ser. 2, vol. 4, 1896, p. 125.—SZEPLIGETI, Gen. Ins., Fasc. 22, 1904, p. 124.

Size small for the genus; honey-yellow; labrum narrow and with the sides apparently parallel for a short distance; length (male), 6.5 mm.

*Head.*—Triangular, about as wide as high; length, 54-51; width, 53; height of eye, 26; malar space, 24-22; width between eyes, 31-30;



width at end of head, 22-21.5; profile of face nearly straight or very slightly convex as far as the lateral facial pits, then very slightly convex to shortly below the eyes, then flat to the apices of the interantennal plates; marginal ridges of the antennal fossae well developed, less prominent behind the median ocellus; honey-yellow, one specimen not marked with darker coloring, the other with blackish-brown diffusion below and behind each eye, this extending forward on the face till only a narrow light stripe is left, and downward to the base of the mandibles, but with a lighter area above the base of each mandible; head pale in front of and behind the eyes, the darker coloring reaching the eye margin at the top of the eye and at the lower hinder corner of each; antennal fossae, vertex, and occiput black, lighter around the edges of the diffusion; face between antennae brownish; head sparsely punctate and clothed with white hairs; antennae black, brown in incompletely colored specimens, more than 24-segmented (broken); eyes dark; ocelli arranged in a triangle, the lateral ocelli slightly nearer the median ocellus than to each other; labrum elongate, pale, honey-yellow, the thickened margin pale brown in the lighter specimen and blackish-brown in the darker; mandibles pale, blackish at tips; beak and palpi pale brown to blackish brown, the terminal segments of the palpi rather stouter than usual in the lighter (male) specimen, longer and apparently more slender in the darker (female?) specimen.

*Thorax*.—Longer than high, honey-yellow, venter light or reddish-brown; pronotum with sides shining, almost smooth in the middle, but finely and more densely punctate along the upper and hinder margins; proepisterna pale honey-yellow, varying to dark reddish-brown, the lower ends of the lobes darker in each case; parapsidal furrows prominent, deep, more groove-like than usual, not punctured, continued straight backwards and meeting to form an acute angle just before the scutellar fossa; median lobe of mesothorax with a broad and shallow but distinct median groove; lateral lobes flattened; fossa with a rather prominent median ridge, and a second fainter ridge close to it on each side; scutellum typical; mesopleurae sparsely and faintly punctate and hairy, the pleural groove running straight forward from the middle of the insertion of the middle coxae, for about a third of the width of the mesopleurae, deep and well defined, but becoming uniformly shallower until it fades out entirely; venter darker, more closely punctate and hairy; metapleurae smooth and shining, sparsely punctate and hairy; profile of the propodeum almost uniformly rounded to the insertion of the abdomen; the propodeum with six longitudinal keels, the two median well separated, farthest apart a distance of about one-third of their length from the hind margin of the propodeum, gradually converging forward and round-

ing into each other, behind converging slightly to the hind margin; with about four more or less distinct transverse keels between these and with other transverse keels connecting the lateral keels to each other and to the median pair; spiracles elongate-oval, almost elliptical.

*Wings*.—Light fuliginous, with the usual transparent spots; venation typical; fore wing 7 mm., hind wing 4.75 mm.

*Legs*.—Honey-yellow; trochanters more or less brownish; fore and middle tarsal claws dark, cleft, hind tarsi wanting; no spines on middle tibiae.

*Abdomen*.—(From a single male specimen.) Elongate, length 3 mm., honey-yellow; smooth, shining, and with whitish hairs; first segment rather stout.

Redescribed from two specimens from Los Angeles, California, probably collected by Coquillett. In one of the specimens the structural character which I have used as distinctive is less pronounced than in the other, and this, in connection with some other more minute differences, leads to a little uncertainty as to the specific agreement of the two specimens. However, I believe that part of the difference may be accounted for by a difference in sex, although the abdomen is wanting in one specimen, so it is not possible to be certain of its sex.

I have been unable to find out anything regarding the type of this species. Presumably it was in the collection of the California Academy of Sciences and was destroyed at the time of the San Francisco earthquake and fire, so I have ventured to redescribe it, designating the above specimens as neotypes and placing them in the United States National Museum collection.

#### BRACON HAEMATODES (Brullé).

*Agathis haematodes* BRULLÉ, Hist. Nat. Ins. Hym., vol. 4, 1846, p. 495.—CRESSON, Cat. Hym. N. Amer., Suppl. vol., Trans. Amer. Ent. Soc., 1887, p. 227.—VIERECK, Trans. Kansas Acad. Sci., 1905, p. 277.

*Agathis meabilis* CRESSON, Trans. Amer. Ent. Soc., vol. 4, 1872, p. 183; Cat. Hym. N. Amer., Suppl. vol., Trans. Amer. Ent. Soc., 1887, p. 227.—DALLA TORRE, Cat. Hym., vol. 4, 1898, p. 144.—SZEPLIGETI, Gen. Ins., Fasc. 22, 1904, p. 127.

*Cremnops haematodes* BRIDWELL, Proc. Kansas Acad. Sci., Dec. 30, 1898, p. 205.

The malar space shorter than the height of the eyes; middle tibiae with two apical spines; hind tibiae with from 2–13 spines clustered above the smaller spur; color red, head more or less black, hind trochanters blackish or darker, at least the hind tarsi and the apices of the hind tibiae black; abdomen often with blackish diffusion over parts of its surface; mesopleural furrow straight; labrum broad; apparently a very variable species; length, 6.5 to 8 mm.

*FEMALE*.—*Head*.—Triangular, slightly wider than long; typical specimen, length, 54; width, 55; height of eyes, 27; malar space, 25; width between eyes, 30; width at bottom of head, 18; interantennal

plates distinct, separated by a deep groove, face only slightly flattened below the antennae, but rather deeply grooved down this flattened area; ridges above the antennal fossae well developed, usually not strongly arched at any point, although this appears to vary some; highest opposite the median ocellus; continuous to the lateral ocelli; profile of face divided into two slight arches, one from the apex of the clypeus to opposite the clypeal foveae, the second from this point to the antennal pits; the whole head more hairy than in many species, face rather uniformly and fairly closely punctured over its whole surface; compound eyes rather large, dark; ocelli pale, the lateral ocelli slightly nearer to each other than to the median ocellus; antennae black; first two segments shining, rest dull, 37-41 mostly 38 or 40 segmented; head typically pale reddish, approaching orange with at least the cheeks to the clypeal foveae, the vertex in the center, the antennal pits and the occiput in the middle, black or blackish; labrum about as long as wide, blackish or blackish-brown, the lower border paler except the apical rim; mandibles pale, bases, and apices black, rather broad, curved at apex, inner tooth smaller than in many other species; beak black or blackish, head including labrum, varying from entirely pale in immature and faded specimens to almost wholly black, except for the lower portion of the clypeus and a border around the eyes.

*Thorax.*—Somewhat longer than high, color very variable; propisterna usually more or less black or blackish; sternum pale, blackish or black; tegulae typically blackish-brown with the inner margin pale but varying from entirely pale reddish to black; propodeum always red; pronotal lobes smooth in center, closely and finely punctate and hairy around the borders, shining; apical pits large; propisterna more coarsely and roughly punctured and hairy; the apical lobes more shining, but also punctured; parapsidal furrows fairly deep, nearly straight, distinctly crenulate; median groove of mesonotum usually distinctly and broadly grooved in front, but sometimes more narrowly and obsoletely; lateral lobes somewhat flattened; hind angles of mesoscutum not very much produced; whole surface of mesonotum sparsely and rather finely punctured and hairy; scutellar fossa rather deep, front wall more or less sloping with only the median carina prominent; scutellum triangular, the sides and end rounded off; mesopleurae shining, fairly closely punctate and hairy, the groove deep and coarsely crenulate, terminating abruptly, nearly horizontal or sloping diagonally upward, equal in length to about half the width of the mesopleurae; venter hardly more hairy than the pleurae; metapleurae less shining, more coarsely and closely punctured, the lower third roughened and irregularly areolate; propodeum areolate, with six longitudinal lines, the two median typically converging gradually in front and suddenly behind, the various pairs

united by numerous transverse carinae, but the whole arrangement varying somewhat; spiracles oval or oblong-oval, also variable.

*Wings*.—Fuliginous, venation typical, light spotting not very noticeable; length, fore 7.1 mm., hind 5.5 mm., of an average specimen.

*Legs*.—Color typically almost reddish, but actually varying from wholly red, except the tarsal claws, more or less of the trochanters, and the apices of the hind tibiae, to wholly black except for the hind coxae and femora; middle tibiae with two apical spines, hind with from 2-13 apical spines; all tarsal claws apparently cleft, the hind with the two teeth deeply and widely separated.

*Abdomen*.—Elongate, slender, lanceolate, the first segment rather long dorsally, but also distinctly broadened toward the apex; the second and third tergites together about as long as the first, the division between the two indicated by a faint transverse groove, the second tergite broadly depressed transversely at about the middle; color reddish, with more or less blackish diffusion dorsally; length, 3-4 mm.; ovipositor about as long as the abdomen, reddish, the sheaths black.

**MALE**.—The male appears to resemble the female closely, showing the same variability of color and structure.

Redescribed from 31 specimens.

The specimens included under this species name appear to group themselves into three lots on the basis of the number of apical spines on the hind tibiae, although the groups do not seem to possess any other characters in common. The distribution of the species with the specimens arranged thus is as follows:

With 2-3 apical spines: 4 females and 3 males from various parts of Texas; 2 females and 2 males from "Ga."; 1 female from Alexandria, Louisiana, July 30; 2 females from Malcolm, Nebraska, October 12 and 24; 2 females from "Ainsworth, W. T., July 20/82"; 1 female, No. 2364, Hubbard's No. 98; 2 males, "Miss."

With 5-7 apical spines: 1 female, Austin, Texas, September 26; 1 female Victoria, Texas, July 15, on alfalfa; 1 female, Alexandria, Louisiana, July 30, on cotton; 1 male, Corpus Christi, Texas, October 16; 1 male, Brownsville, Texas, September 29; 1 male, San Antonio Texas; 1 female, Onaga, Kansas; 1 female, "Ill."

With 9-13 apical spines: 2 females, Mission, Texas, May 13, bred from "Lep."; 1 male, "Colo. 1569"; 1 male, Victoria, Texas, July 28.

This is by far the most variable American species in the genus *Bracon*, and I am still a little undecided as to whether some of the specimens included here should be considered as properly placed. I have not been able to find any definite characters or sets of characters which would serve to distinguish the more widely varying specimens from those which are typical. There is no question but that

Cresson's *meabilis* is included here, as I have examined the types, and some of the specimens fit very closely Brullé's descriptions of *Agathis haematodes*, so I have used this name for the species.

I do not know the location of the type of *Agathis haematodes* Brullé, which was described from a single male from Philadelphia. The types of *Agathis meabilis* Cresson are in the collection of the Academy of Natural Sciences of Philadelphia.

**BRACON VIRGINIENSIS, new species.**

Plate 27, fig. 19.

*Agathis haematodes* Br. (*Cremnops*) SMITH, List of the Insects of New Jersey, 1909, p. 609.

*Cremnops haematodes* BANKS, Ent. News, vol. 23, 1912, p. 108.

Malar space shorter than the height of the eyes; body, including mouth parts, wholly pale red, except the antennae and eyes, tarsal claws, hind tarsi, and tips of hind tibiae; abdomen sometimes with blackish diffusion above; hind tibiae with two apical spines; first abdominal segment very long and slender; length, 8 mm.

FEMALE.—*Head*.—Triangular, wider than high; length, 55; width, 61; height of eyes, 30; malar space, 24; width between eyes, 33; width at bottom of head, 18; interantennal plates distinct, rather widely separated by a rather flat groove with rounded bottom; face hardly flattened below the antennae, broadly and shallowly grooved for about one-third of its length below the antennae; profile nearly straight, very slightly and irregularly arched, faintly depressed opposite the clypeal foveae; ridges surrounding the antennal fossae prominent, highest opposite the upper margin of the median ocellus, continuous to the lateral ocelli; head, including the mouth parts, wholly red, except for the compound eyes, which are dark, and the antennae, which are blackish; face shining, rather densely punctate and hairy below the antennae, more sparsely and faintly so below on the clypeus and on the cheeks; compound eyes relatively large, dark; ocelli light, approximately equidistant from one another; antennae black or blackish-brown in some lighter specimens, 40–41 segmented, first two segments shining, the rest dull; labrum slightly wider than long, pale, the apical raised rim darker, and nearly straight for a short distance, shining, sparsely and finely punctate and hairy; mandibles pale, tips blackish; beak wholly pale, the second segment of both the maxillary and labial palpi the largest and longest, the last segment of each elongate, slender, nearly cylindrical.

*Thorax*.—Longer than high, wholly red; lateral lobes of pronotum smooth, shining, finely, and densely punctate around the margins, the apical pits deep but short; proepisterna more coarsely punctured and hairy, the apical lobes smooth and shining; mesonotum shining, sparsely punctured and hairy; parapsidal furrows distinct, not very

deep, rather finely crenulate, converging behind, meeting before the scutellar fossa, and not continued to this fossa as a distinct groove; median lobe distinctly flat grooved medially, at least in front, lateral lobes slightly flattened in the middle of the disk of each; hind angles of the mesoscutum produced into broadly rounded, vertically compressed lobes; scutellar fossa rather shallow as compared with other species, the bottom concave, the front wall sloping strongly forward, with a single prominent longitudinal carina bisecting it; scutellum relatively broad and short, sides rounded off, not tapering strongly behind, apex bluntly rounded; mesopleurae sparsely punctured and hairy over the whole of their surface, more densely so below and on the venter; mesopleural furrow shallow, deeper behind and fading out completely in front, about as long as half the width of the pleurae, running diagonally upward; metapleurae shining, sparsely and rather coarsely punctured, only the lower border roughened and with ridges; propodeum coarsely areolate, the median ridges most widely separated behind, coming gradually to meet each other in front; spiracles oval.

*Wings*.—Length, fore, 7 mm., hind 5.5 mm.; fuliginous, venation and light spotting typical.

*Legs*.—Entirely red, except all the tarsal claws, the apices of the hind tibiae, and all the hind tarsi and the extreme base of the metatarsus; hind tibiae with 2 stout spines at the apex just above the smaller apical tibial spur; middle tibiae usually with 1, often with 2 apical spines.

*Abdomen*.—Length about 4 mm., elongate, slender, lanceolate, the first segment relatively very long, and only slightly widened toward the apex; the tergite of segments two and three also very long, these three segments occupying almost four-fifths of the length of the abdomen, the division between the second and third segments indicated dorsally by an indistinct flat groove; color wholly red, but sometimes with blackish diffusion either near the middle or apically; ovipositor red, the sheaths black, length about 3.5 mm.

*MALE*.—Apparently resembles the female in all essential structural characters as well as in coloration; first three segments of the abdomen not occupying more than two-thirds of its total length.

Described from 12 female specimens from Falls Church, Virginia, June and July (3), Great Falls, Virginia, June 27 (1), Washington, District of Columbia, June 20 (1), Westville, New Jersey, August 30 (1), and 1 each from "N. Y.," "Miss.," and "N. C.," while three specimens have no data accompanying them, and 9 male specimens from "Falls Church, Va., July and Aug." (3), Philadelphia, Pennsylvania; (1), Glenside, Pennsylvania, June 8 (1), Wallace, Kansas, July (1), Lexington, Kentucky, (1), "L. I." (1), and a bred specimen without host or locality record.

This species is labeled "*Cremnops haematodes* Brullé" in the Philadelphia Academy of Natural Sciences collection and in the United States National Museum material, and probably in other collections also, but a cursory examination of Brullé's description will show that this identification is not correct.

*Type*.—Cat. No. 20484, U.S.N.M.

#### EXPLANATION OF PLATES.

##### PLATE 24.

FIG. 1a. Fore and hind wings of *Bracon vulgaris*, showing the cells named according to the usual nomenclature: *a*, anal; *ap*, apical; *ar*, areolet (second cubital); *cu*<sub>1</sub> first cubital; *cu*<sub>2</sub> third cubital; *d*, discoidal; *d*<sub>1</sub> first discoidal; *d*<sub>2</sub>, second discoidal; *d*<sub>3</sub>, third discoidal; *m*, median; *r*, radial; *sm*, submedian.

1b and 1c. Fore and hind wings of *Bracon vulgaris*, showing the veins named according to the usual nomenclature: *a*, anal; *b*, basal; *c*, costal; *cu*, cubital; *d*, discoidal; *f*, fold; *m*, median; *r*, radial; *re*, recurrent; *s*, stigma; *sd*, subdiscoidal; *tc*, transverse cubital; *tc*<sub>1</sub>, first transverse cubital; *tc*<sub>2</sub>, second transverse cubital; *tm*, transverse median (nervulus).

##### PLATE 25.

FIG. 2. Head of *Bracon vulgaris* from the front.

3. Head of *Bracon vulgaris* from above.

4. Beak of *Bracon vulgaris* from behind.

5. Head of *Bracon vulgaris* from the side and behind.

6. Profile of metanotum and propodeum of *Bracon slossonae*.

7. Profile of metanotum and propodeum of *Bracon vulgaris*.

##### PLATE 26.

FIG. 8. Thorax of *Bracon vulgaris* from the side: *A*, abdomen; *C*<sub>1</sub>, fore coxa; *C*<sub>2</sub>, middle coxa; *C*<sub>3</sub>, hind coxa; *E*<sub>1</sub>, proepisternum *h*, parapsidal furrow; *I*, propodeum; *N*<sub>1</sub>, pronotum; *N*<sub>3</sub>, metanotum; *p*<sub>2</sub>, prescucum of mesothorax; *P*<sub>2</sub>, mesopleura; *P*<sub>3</sub>, metapleura; *S*<sub>2</sub>, scutum of mesothorax; *Sc* and *Sc*<sub>2</sub>, scutellum (of mesothorax); *sp*, spiracle; *St*<sub>2</sub>, sternum of mesothorax; *T*, tegula.

9. Thorax of *Bracon vulgaris* from above. Lettering as figure 8.

10. Abdomen of *Bracon vulgaris*, female from the side.

11. Male genitalia of *Bracon vulgaris* from the side.

12. Ventral segments of abdomen of male of *Bracon vulgaris*.

##### PLATE 27.

FIG. 13. Prothorax of *Bracon slossonae* from the side, showing groove.

14. Prothorax of *Bracon slossonae* from above.

15. Prothorax of *Bracon vulgaris* from the side, showing pits.

16. Prothorax of *Bracon vulgaris* from above.

17. Fore tarsal claws of *Bracon vulgaris*.

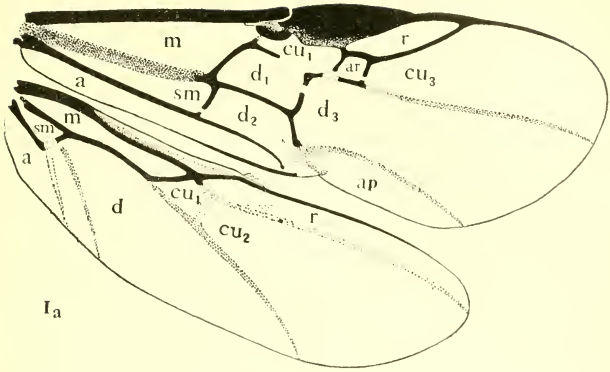
18. Hind tarsal claws of *Bracon vulgaris*.

19. Apex of hind tibia of *Bracon virginiensis*, showing spines.

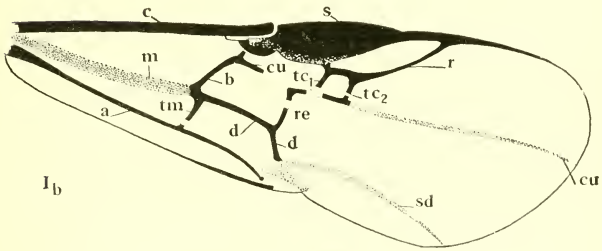
20. Apex of hind tibia of *Bracon vulgaris*, showing spines.



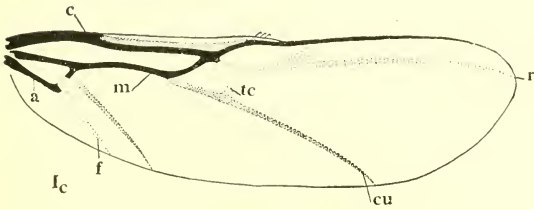




I<sub>a</sub>



I<sub>b</sub>

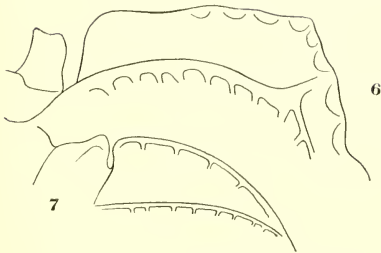
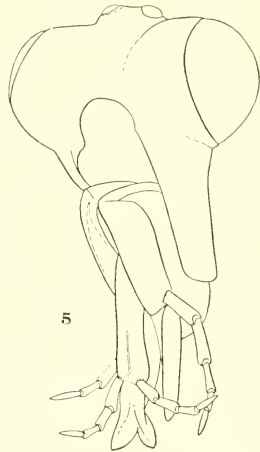
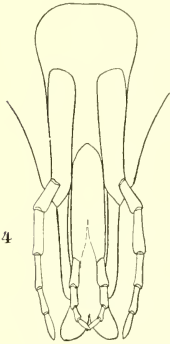
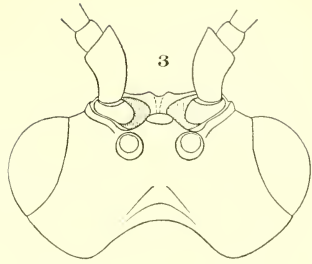
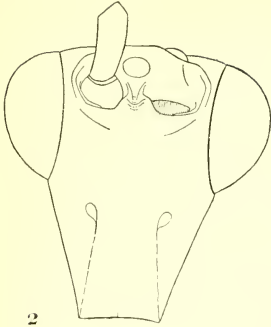


I<sub>c</sub>

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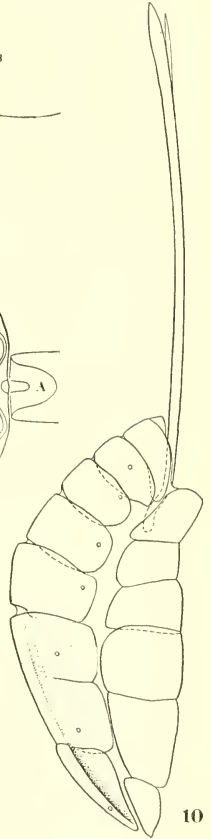
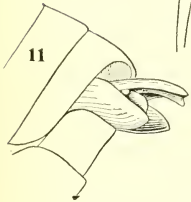
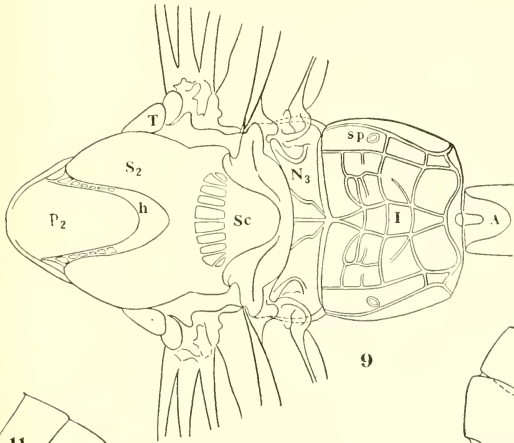
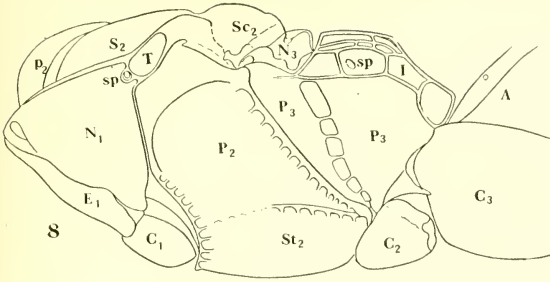


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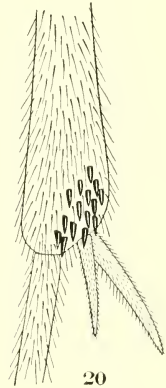
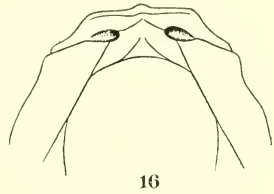
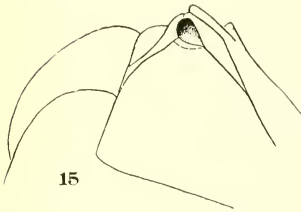
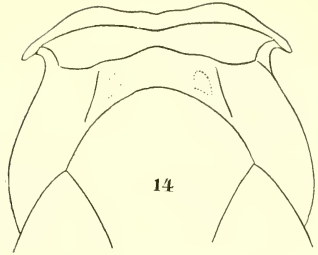
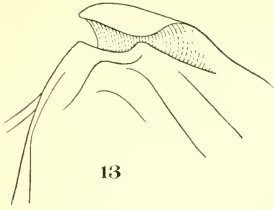




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