NEW SPECIES OF COLLEOPTERA OF THE GENUS *AGRILUS*.

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For several years considerable study has been given the specimens of this genus and some of the more important results are here presented :

Agrilus champlaini, new species. *Holotype* a male. Form of *muticus*, robust, colour black with a purplish tint, subopaque. *Antennæ* reaching the middle of the prothorax, serrate from the fourth joint, bronzed ; *head* densely coarsely punctured, strigate above and pubescent below the middle, occiput somewhat concaved, the median impressed line extending to the middle of the front, eyes dark. *Prothorax* one-fourth wider than long, widest at the middle, one-fourth wider at the base than at the apex, sides regularly arcuate, hind angles obtuse with a rather strong carina, lateral margin sinuous, two discal foveæ in front of the middle, basal depression distinct, lateral faint ; surface transversely rugose, becoming confused and finer at the sides and anterior angles. *Scutellum* not carinate, notched. *Elytra* nearly parallel to the apical seventh, tips separately and broadly rounded with coarse unequal serrations, disc slightly flattened with a vague costa, suture elevated behind the middle, surface rather coarsely irregularly granulate-imbricate, finer in the basal depressions which are moderately deep. *Body* beneath more shining, bronzed, with purplish reflections especially along the sides and apex of the abdomen ; *prosternal* lobe sinuate-truncate, intercoxal process broad, acute at tip, surface roughly densely punctate, propleuræ granulate ; *metasternum* rather closely granulate becoming subasperate posteriorly like the coxal plates ; *abdomen* finely punctate, sparsely along the middle, more closely along the sides, resembling imbricated scales on the first segment and with undulating lines connecting the punctures on the others ; *pygidium* coarsely punctate with a strong projecting carina. First abdominal segment flat or slightly concave, second with smooth groove extending nearly to the posterior suture, last ventral eroded-truncate at the tip, vertical portion of abdomen granulate, inferior margin serrate, apex smooth and truncate. Front and middle tibiæ mucronate ; *claws* similar on all feet, cleft with the inner parts broad and curving inward, the apices nearly touching.

Length 8 mm. Width at base of elytra 2.3 mm.

The females at hand have the front less pubescent and more concave, granulations of the eye more distinct, sides of the prothorax more arcuate, being widest in front of the middle, discal depressions more pronounced and with the intervals between the strigæ more distinctly

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punctate, surface of the elytra more finely and regularly imbricate; the abdomen is smoother and more shining bronze, with the first ventral slightly flattened; the claws are alike on all the feet, the inner portion quite broad and curving inward slightly, leaving a much wider space between the apices than in the male.

The pubescence of this species is not at all evident except on the post-clypeal area, the anterior angles of the prothorax, and the apices of the elytra. The sexes do not vary much in this respect, but I suspect that my males do not show the normal elytral pubescence; possibly it is discoloured. On the under side of the body the vestiture is short and sparse, giving a silver tint to the abdomen; it becomes more dense on the prosternum of the males.

This species would naturally be placed next to *angelicus* in Dr Horn's table (Trans. Am. Ent. Soc., XVIII, p. 283). Through the kindness of Mr. H. C. Fall, of Pasadena, Cal., I have been enabled to examine a specimen of *angelicus*, and can say that it does not resemble the present species in colour, form or punctuation. *Champlaini* might be confused with *anxius* and allies, but the darker colour, more robust and shorter form, sculpture, and structure of the claws should at once distinguish it.

This species is represented by three specimens (emerged May 29, 1911), two females and one male, all bred from the twigs of the horn-beam, *Ostrya virginica*, by Mr. Alfred B. Champlain, at New Haven, Connecticut. The specimens and two of the galls were sent to me by Dr. W. E. Britton from the State Agricultural Experimental Station in that city. It is through the kindness of these two gentlemen that the above description has been made. The galls were collected at Lyme, Conn., April 30, 1911.

The gall is in each case about one inch in length, fusiform, expanding to a diameter of 12 millimeters in the middle, and on branches of about six millimeters in diameter. One of the galls was split open and the bark removed from one side, so that the course of the larva was shown to be a spiral from the point of entrance toward the end of the twig. It circled the twig in four distinct courses, each one increasing in diameter about one-half the previous one and leaving a ridge between them. They are tightly packed with debris and are wholly in the wood, leaving the bark intact. On the fourth spiral the gallery leads directly to the heart of the branch, from whence it is hollowed out in an arcuate course downward until it intersects the bark in an oblong exit very near the point of entrance. The exit in the two specimens at hand measures three by two millimeters, the long diameter being transverse to the twig.

Since the above was written a male specimen has been received from Mr. H. B. Kirk, which was taken at Harrisburg, Pa., June 16, 1911. It differs slightly from the Connecticut male in the following particular: The front is more concave, the two discal foveæ of the prothorax are very indistinct, the prosternal lobe is distinctly emarginate in front, the scutellum is not notched, and the form is slightly more cuneate; with the elytral tips normally serrate.

The *holotype* and *allotype* are in my collection, and the remaining female *paratype* is in the collection of the Connecticut Agricultural Experimental Station.

A. cratagi, new species.—*Holotype* a male. Form of *obsoletoguttatus*, elongate. *Colour* olive-æneous, suffused with cupreous on apical third, varying to entirely cupreo-æneous, shining. *Antennæ* reaching the middle of the prothorax, serrate from the fourth joint, æneous. *Head* slightly flattened, greenish, granulate-punctate, more closely in a post-clypeal pubescent area, smooth spaces near the eyes finely alutaceous; occiput impressed, punctures tending to form strigæ posteriorly; median line extending to the middle of the front, where it ends in a slight depression. *Prothorax* one-fourth wider than long, varying in the specimens at hand from sides nearly parallel to regularly arcuate, hind angles rectangular, with a strong, nearly straight carina extending almost half the length of the prothorax, lateral margin slightly sinuate; disk with an anterior circular depression and a posterior oblong one, lateral oblique depressions moderate; surface transversely strigate with punctures between the strigæ. *Scutellum* transversely carinate. *Elytra* slightly sinuate behind the humeri and faintly dilated behind the middle, apices separately rounded and serrulate, disk slightly flattened, with the faintest indication of a costa, basal depressions rather slight, surface imbricate in very regular transverse series, gradually becoming finer toward the apex, pubescence very indistinct, visible only in the basal depression of the elytra and the anterior angles of the prothorax. *Body* beneath shining æneous with a faint cupreous tinge; prosternal lobe distinctly emarginate, granulate-punctate, with a thick mat of erect brownish hair extending from the anterior margin down the intercoxal process to the acute tip, and covering a small patch between the meso-coxæ; propleuræ and sides of metasternum granulate-imbricate, sparsely pubescent; metasternum smoother at middle. *Abdomen* imbricate on the first ventral, finely imbricate and sparsely punctate on the others; first ventral with a small patch of brownish hair on the

intercoxal process, last ventral oval and eroded at tip; inferior margin of the vertical portion of the abdomen serrulate. *Pygidium* with an evident carina, not projecting, coarsely sparsely punctured. *Claws* similar on all the feet in both sexes, nearly bifid. Length 6 to 8 mm. Width 1.5 to 2.3 mm.

The females at hand differ as follows: Head cupreous or æneus, more concaved along the median line, more coarsely sparsely sculptured, an opaque depressed area above the clypeal carina; sides of prothorax slightly more arcuate; beneath sparsely pubescent, no erect brownish hair.

The two extremes in size, as given in the above description, are both females; the other specimens average 6.5 mm. in length.

A pair of this species first came to me from Mr. A. B. Champlain, with the label, "Chinchilla, Pa., VII, 2." The past year Mr. H. B. Kirk sent me four male and two females bred from the dead fallen trunk of *Cratægus*, which was also infested with *Xylotrechus colonus* and *Neoclytus luscus*. The material was collected by Mr. W. S. Fisher, of Highspire, Pa., and Mr. Kirk, at Harrisburg, Pa., March 11, 1911, and the specimens are labelled "Emerged IV, 6-11."

This species should be placed between *politus* and *fallax* in Horn's table, but it resembles neither of them so much as *obsoletoguttatus* in size and shape. From the two latter it can at once be distinguished by the lack of pubescent spots on the elytra, and the structure of the claws. It resembles the narrower forms of *politus* somewhat, but the hairy prosternum will at once separate the males, and the claws, form of prothorax, broader head, and the more parallel form will be sufficient to distinguish either sex in a series of *politus*.

The distribution of the types is as follows: *Holotype*, *allotype* and two *paratypes* in my collection, a male and female *paratype* in the collection of Mr. H. B. Kirk, a male *paratype* in the collection of Mr. W. S. Fisher, and a male *paratype* in the collection of Mr. Chas. Liebeck, to whom I am much indebted for comparing many specimens with the Horn types.

A. cephalicus Lec.—Original description (Trans. Am. Phil. Soc., XI, p. 249). Obscurus, ænescens, capite cupreo, haud pubescente fortiter haud confluent punctato, sat profunde canaliculato, thorace latitudine haud brevior, dorso canaliculato et biimpresso, lateribus subrectis fortiter impressis, basi bifoveato, angulis posticis oblique carinatis, elytris sat fortiter dense granulatis, subunicostatis, apice subserratis rotundatis. Long., .18-.25. Locality: "Middle States and Lake Superior."

The above species was suppressed as a synonym of *egenus* by Dr. Horn in his monograph without explanation or remarks, and it seems to be entirely unwarranted. In making an examination of the *egenus* series in the Le Conte collection at Cambridge, I was much surprised to find that the specimen bearing the label "*A. cephalicus* Lec." (and also "*egenus* No. 11") belonged to a different group, having the antennæ serrate from the fourth joint. Numbers 3, 5 and 16 were also this species, and there were seven specimens having the fourth joint serrate and the inner lobe of the claws incurved; these are probably *otiosus*. The type of *puncticeps* Lec., which has the fourth joint serrate, is placed as No. 13 in the *egenus* series. This was also made a synonym of *egenus* by Dr. Horn. The exact standing of *puncticeps* is at present doubtful; I was inclined to place it in the *otiosus* group, although I was unable to see the claws of the middle tarsi, which were the only ones intact; but since reading Le Conte's synopsis, in which he places it in the group with the inner lobe of the claws contiguous, I consider it to be a valid species. If it should prove to be identical with *cephalicus*, the name *puncticeps* will have priority.

The Le Conte specimen bearing the label *cephalicus* is a female, and I have prepared the following re-description from five males from Highspire, Pa., June 12 to 20, 1909, and June 14, 1910, all collected by Mr. W. S. Fisher, of that place. He also sent me two males from Jeanette, Pa.

A. cephalicus Lec. Re-description: Form of *otiosus*; colour æneous-olive. *Antennæ* moderate, bluish æneous, serrate from the fourth joint, second and third joints with rather long pubescence on the under side. *Head* convex, bluish, median line varying from distinctly to faintly impressed, and extending to a post-clypeal pubescent area, sparsely punctate, finely alutaceous, strigate on the occiput. *Prothorax* a little wider than long, narrowed at the base, sides feebly arcuate, lateral margin nearly straight, hind angles with a well defined carina, disk convex, subequally bi-impressed on the median line, an oblique lateral depression; surface transversely strigate, strigæ becoming confused anteriorly. *Scutellum* transversely carinate. *Elytra* subparallel, narrowed at the apical third to the rounded serrulate apices; disk flattened, faintly costate; surface densely imbricate, basal impressions moderate. *Body* beneath bluish varying to greenish æneous. *Prosternal* lobe distinctly emarginate and covered with an erect grayish pubescence, or hair, that extends to near the middle of the first ventral segment; it is shorter and less noticeable on the metasternum; tip of the intercoxal process of pros-

ternum acute; propleuræ and coxal plates subgranulate, sparsely pubescent; metasternum scabrous-imbricate; ventrals imbricate, becoming finer toward the apex and sparsely punctate along the middle, tip of last ventral oval, granulate. *Pygidium* coarsely irregularly punctured without distinct carina. *Tibiæ* mucronate on all the legs. *Claws* with a broad obtuse tooth at the base, similar on all the feet. Length 4.5 to 6 mm. Width 1.2 to 1.4 mm.

A male from Lyme, Conn. collected by Kirk and Champlain July 4, 1911, seems to belong to this species but does not quite accord in some particulars. A male from Vicksburg, Miss., sent me by Col. T. L. Casey, agrees very well with the Pa. specimens, but it is somewhat smaller and of a lighter bronze-aeneous colour.

A female from Highspire, Pa., which agrees well with the type, shows the following sexual differences: form slightly more robust, colour bronze-aeneous, head larger and broader between the eyes, more densely punctate, less pubescent, aeneous in colour; prothorax less narrowed behind; elytra slightly dilated behind the middle; the median area of denser pubescence of the male is here lacking. Two females from Jeannette, Pa., are somewhat smaller and resemble the males more nearly in form. I have also seen a male from Lafayette, Ind., June 21, 1907; collection of Mr. A. B. Wolcott, Chicago, Ill.

In the type there is an apparent carina of the pygidium which is caused by a median smooth space sharply limited by the coarse and irregularly confluent punctuation on each side of it. The punctures are very sparsely placed toward the margin. The pygidium of a single male that I have dismembered shows similar characteristics.

Agrilus auricomus, new species. *Holotype* a male. Form elongate, depressed, broadest at the base of the elytra, black or olivaceous black, shining; thorax shining aeneous with a path of golden pubescence in the lateral depression extending to the anterior angles. *Antennæ* reaching the middle of the prothorax, aeneous, serrate from the fourth joint. *Head* densely coarsely punctate, becoming transversely strigate above the middle; occiput feebly impressed; the median impressed line extending from the back of the head nearly to the clypeus; a triangular patch of golden pubescence above the clypeus, the suture of which is indicated by a fine carina; granulations of the eye unusually fine or indistinct. *Prothorax* one-third wider than long, base very slightly wider than the apex, at the middle equaling the elytra at the base, sides regularly arcuate, lateral margin sinuate; disk depressed and with a shallow median impression; two small circular foveæ each side in front of the middle, vaguely defined by surrounding smooth space; lateral depressions deep, causing sides to appear explanate; surface transversely strigate; hind angles with a faint carina. *Scutellum* carinate at the sides, interrupted at the middle. *Elytra*

slightly sinuate behind the prominent humeri, feebly broadened behind the middle, basal depressions deep with two very faint impressions behind them; the junction of the discal flattened portion with the convex sides of the elytra has the appearance of obtuse costæ curving inward from the humeri and vanishing near the middle of the elytra; apices separately rounded, subacute and serrulate; surface coarsely imbricate-granulate. *Body* beneath shining aeneous with golden pubescence which is sparse on the middle of the abdomen and becomes very dense on the episterna, sides of the metasternum, outer half of the coxal plates, vertical portion of the abdomen, and a triangular patch on each side of all the abdominal segments. *Prosternum* thickened, swollen behind the lobe which is slightly sinuate-truncate in front and with a distinct marginal bead; intercoxal process slightly concave, longitudinally with an acute and depressed tip; surface densely punctate. *Metasternum* rather densely punctate, becoming rather strigate at the sides. *Abdomen* with the first segment flattened and rather coarsely densely punctate at the middle, becoming strigate at the sides; second segment with a deep smooth groove with sharply defined edges narrowing and vanishing at the posterior third, sparsely coarsely punctate; last three segments finely and less sparsely punctate; apex of the last segment subtruncate with a slight tendency to emargination; median carina of the pygidium strong and projecting. *Claws* cleft alike on the middle and hind tarsi; nearly bifid on the front pair with the inner lobes less incurved; front and middle tibiæ distinctly mucronate. Length 10 mm. Width 2.4 mm. at the base of the elytra.

Three males of this species were taken at Framingham, Mass., May 31, 1909. One of these is now in the collection of Prof. H. C. Fall, Pasadena, Cal., and to him I am indebted for an examination of this specimen with reference to the above description. There is very little variation in the two specimens in my collection, the type being slightly more cuneate in form.

A female collection by Mr. A. B. Champlain at Lime, Conn., now in the Experiment Station collection at New Haven, May 29th, 1910, is referred to this species. It differs in being more black in colour (but not the opaque black of *bilineatus*) and more robust in every way while being only slightly longer — 10.8 mm. The occiput is more impressed, and the granulations of the eyes normal. The carina of the hind angles of the thorax is more distinct; the prosternal lobe shows a slight emargination in front and is less swollen behind it. The punctuation is more dense beneath and the golden pubescence covers less area. The claws are cleft alike on all the feet, the inner lobe being nearly as long as the outer and somewhat incurved. The last abdominal segment is slightly eroded-granulate and faintly truncate. The thorax at the middle, the elytra at the base and at the enlargement behind the middle measure 3 mm.

Another female from New Haven, Conn., June 12, 1911, collected by Mr. B. H. Walden is similar to the preceding except in the following details: occiput less impressed; thorax with a larger and more elongate

basal depression; lacking the two anterior foveæ; lateral margin more sinuate; at middle slightly broader than the elytra at the base; carina of the hind angles obsolete; tips of the elytra more acute and prolonged and having a sutural angle equal to one-seventh the length of the elytra; between the first and second segments of the abdomen there is a distinct suture extending half way to the middle of the body; last segment rounded with the edge eroded-granulate; the pubescence is a yellowish white. Length 11.8 mm., width 3 mm. at base of elytra and 3.5 mm. behind the middle at the enlargement. The colour of this specimen is slightly olivaceous as in the type.

This species is closely related to those specimens that have been referred to by Dr. Horn (Trans. Am. Ent. Soc., Vol. XVIII., page 308) as the olivaceous variety of *acutipennis* but the form and the golden pubescence should at once separate it from that variety.

It appears to me that the term "last abdominal segment serrate" has not been hitherto clearly defined or the serrations have escaped notice in many species. In the present species the lower edge of the vertical portion of the abdomen is strongly serrate. The serrations begin near the middle of the last segment where the overhang of the superior part commences to be prominent, and, increasing in coarseness, extends to the smooth apical area where the two edges of the superior portion merge directly beneath the pygidial carina. The inferior portion of the last segment at the tip, which is the part referred to in the previous description, is granulate near the edge. In the females the first four abdominal in the larger specimen and the first three in the other are visible when the specimens are viewed from directly above. In the males only the first two segments are so visible.

The short grayish pubescence that covers the elytra and thorax in specimens of *anxius* and related species is here almost invisible except on the apices of the elytra and for a short distance along the suture. This pubescence arises from slight depressions in the furrows between the rugæ and is seen to be arcuately decumbent in a lateral view across the elytra toward the light. Under a high-power hand lens it appears as minute silvery points on the elytral disk of this species. By placing specimens with the head toward the light and the body inclined backward toward the observer pubescent spots and apical vittæ can be seen on many species that have been described as being without elytral pubescence.

In conclusion it may be said that the studies in the *otiosus* and *anxius* groups have been, so far, rather disappointing, due to the difficulty of getting series of both sexes. The only species at all abundant in this locality is *otiosus*, taken on oak leaves. The olivaceous variety of *acutipennis* has been encountered quite often on oak, and *bilineatus* occurs in favourable places on oak sprouts; but in general the species turn up singly or in pairs, with aggravating slowness. Several very interesting problems are suggested by the material at hand, and more specimens from widely separated localities may present a solution.

Mailed August 6th.