	Mean weights of species.	Mean weights moved.	Mean ratios.	Individual maximum ratios.
TRACTION.				
Melolontha vulgaris	0·940 gr.	13·456 gr.	14·3	23·2
Anomala Frischii	0·153 „	3·721 „	24·3	66·4
PUSHING.				
Oryctes nasicornis	2·117 gr.	6·702 gr.	3·2	4·2
Geotrupes stercorarius ..	0·492 „	8·298 „	16·9	28·4
Onthophagus nuchicornis	0·056 „	4·457 „	79·6	92·9
FLIGHT.				
Bombus terrestris	0·214 gr.	0·134 gr.	0·63	0·87
Apis mellifica	0·083 „	0·065 „	0·78	1·00

The comparative examination of the locomotive limbs in most of the species experimented on has shown me that the volume of the muscles of these organs appears in general to decrease more rapidly in proportion than the weight; it seems, therefore, that we must attribute the greater strength of the small species to a greater muscular activity or energy. The reason of this difference in favour of insects of small size is, perhaps, beside all anatomical or physiological considerations: thus the hardness of the ground in the case of burrowing insects, the objects which impede their progress in simple locomotion, and the inertia of the air in flight, form resistances to be overcome which are the same for the large and small species; now to avoid giving a useless excess of force to the former, or fatally depriving the latter, nature must endow the smaller species with a greater muscular energy. Considerations of the same kind may, in my opinion, be applied to the first of the principal facts deduced from my investigations, namely the enormous strength of insects in comparison with vertebrate animals; for if the reasoning appears just when applied to two insects of different sizes and weights, it must be admitted, I think, with still more reason, when an insect is compared with a mammal.

XVII.—*Descriptions of several Species of Trichopterygidæ found by Dr. H. Schaum in various parts of North America and Brazil.* By the Rev. A. MATTHEWS.

[Plate V.]

THE insects described in the following pages were collected in various parts of North America and in Brazil by Dr. Schaum, of Berlin, to whose kindness I am indebted both for the privilege of thus introducing them to the notice of entomologists, and

also for his liberal donation of examples of every species, including even those of which but one specimen has yet been found.

In investigating the nomenclature of these insects I have been much impeded by the difficulty of obtaining reference to a paper published by Mr. Haldeman in the 'Journal of the Natural History Society of Philadelphia,' in which he has described six American species of this family. After searching in vain for this publication in the Library of the British Museum, and in other places both in this country and on the Continent, I met with it at last, through the kind assistance of Dr. Power, in the University Library at Cambridge.

All the species described by Mr. Haldeman appear to be represented among the captures of Dr. Schaum. But I regret to say that his descriptions are so extremely vague that I much doubt whether some of the references which I have made are really correct. If they are correct, it becomes necessary to alter two of Mr. Haldeman's names, viz. *T. rotundata* and *T. fuscipennis*, since the former of these was previously used by M. von Motschulsky for another species of the same genus described by him in the 'Bulletin de la Soc. Imp. de Moscou,' in 1845, and the latter (*T. fuscipennis*) by Gillmeister, also in 1845, in Sturm's 'Deutschlands Fauna,' to designate what he supposed to be a variety of *T. atomaria*. For the sake of avoiding confusion, I have therefore substituted other names for these two species. The first I have called *T. glabricollis*, as indicative of a specific difference; and to the other I have assigned the name of *curstans*, used by M. Nietner for a species of *Trichopteryx* taken in Ceylon, and described in these 'Annals' for 1856. With this description, and also with types received from M. Nietner, Dr. Schaum's insects agree in every particular. The same remark is equally true with regard to *Ptenidium macrocephalum*, another species found by M. Nietner in Ceylon, and also by Dr. Schaum in America. Of the remaining four described by Mr. Haldeman, *T. discolor* and *T. aspera* appear to be distinct and well-marked species; *T. abrupta* seems to be identical with *T. fascicularis*, Herbst; and *Ptenidium terminale*, according to his description, agrees in every point with *P. apicale*, Erichson.

Three of the species taken by Dr. Schaum are new and undescribed, all of them distinct and very interesting, especially the one which I have called *T. Schaumii* in honour of its captor; this insect bears a considerable resemblance to the curious *Astatopteryx laticollis* of M. Perris in the excessive development of its thorax. The other seven approach so closely to European forms already well known, that I have assigned to them the names now in use. Although some of these differ slightly from

the European type in size or intensity of colour, yet I do not consider the difference sufficient to justify their separation, especially since the superficial sculpture (so important in determining the species of this family) remains the same.

Trichopteryx Schaumii, n. sp. Pl. V. fig. 1.

T. rufo-castanea, nitidissima, convexa, pilis brevibus sparse vestita, tuberculis nullis; pronoto validissime dilato; elytris brevibus, valde attenuatis; abdomine elongato. Long. corp. $\frac{5}{8}$ lin.

Caput modicum, sat elongatum, leviter remoteque punctatum, nitidissimum, palpis atque antennis flavis, his ad apices fusciscentibus.

Pronotum validissime dilatatum, elytris permulto latius; angulis anticis productis, acutis; margine posteriore arcuata, angulis latis, valde elongatis, partem quartam elytrorum amplexis; nitidissimum, punctis minutis, longe segregatis notatum, marginibus lateralibus atque angulis posticis dilutioribus.

Scutellum magnum, triangulare, elongatum, fortiter punctatum, aut potius asperatum.

Elytra brevia, validissime attenuata, fortius ac seriatim punctata vel asperata, apicibus rectis; læte rufo-castanea, ad suturam dilutiora.

Abdomen elongatum, valde attenuatum, segmentis sex apertis, modice punctatum.

Pedes læte flavi.

Subtus castanea; ore, coxis atque segmentis ultimis abdominis flavis.

Habitat Americam septentrionalem, exemplo unico in Louisiana capto.

Species præclara, distinctissima, ab omnibus facillime cognita.

Trichopteryx glabricollis, Matthews. Pl. V. fig. 2.

Trichopteryx rotundata, Haldeman.

T. nigra, nitida, elytris rufo-piceis, brevis, lata, valde convexa, tuberculis nullis, pilis pallidis sparse vestita. Long. corp. vix $\frac{1}{2}$ lin.

Caput magnum, latum, indistincte leviter punctatum, nigrum; antennis pallide flavis, ad apices fusciscentibus.

Pronotum latum, quam convexissimum, levissime punctatum, postice sat dilatatum, angulis valde productis elytrorum humeros tenaciter amplexis; nigrum, angulis posticis piceis.

Scutellum magnum, triangulare, nigrum, profunde asperatum.

Elytra brevia, quadrata, fortius asperata, rufo-picea, sutura dilutiore.

Abdomen longius exsertum, rufo-piceum.

Pedes pallide flavi.

Subtus castanea; ore, coxis atque apice abdominis flavis.

Habitat Americam septentrionalem, in provincia New York capta.

Hæc species forma rotundata, convexissima differt ab omnibus

hujusce generis nisi *T. Matthewsii*, Wollaston (Cat. Col. Can. p. 103), ab hac facile potest distingui antennis multo brevioribus, atque capite et pronoto glabris, nitidis, dum partes eædem alterius tuberculis elevatis atque lineis reticulatis ornatæ sint.

Nomen "*rotundata*" in hoc genere prius usitatum fuit a D. Motschulsky, Bull. Moscou, 1845.

Trichopteryx cursitans, Nietner. Pl. V. fig. 3.

Trichopteryx fuscipennis, Haldeman.

T. sat convexa, nigra, nitida, elytris rufo-fuscis, tuberculis parvis, fere seriatim dispositis, interstitiisque alutaceis oblecta, pube densa valde sericea per totum corpus vestita. Long. corp. $\frac{3}{8}$ — $\frac{1}{2}$ lin.

Caput breve, latum; antennis modicis, testaceis, ad apices fusciscentibus.

Pronotum ad modum *T. atomariæ* dilatatum, margine posteriore sinuato, angulis sat productis elytrorum humeros amplexis, disco plus minusve denudato; nigrum, angulis posticis late testaceis.

Scutellum modicum, triangulare.

Elytra pronoto angustiora, leviter confertissime asperata, sat depressa, parum attenuata, apicibus parum rotundatis; rufo-fusca, lateribus atque sutura in nonnullis nigrescentibus.

Abdomen nigrum, sat exsertum.

Pedes testacei.

Subtus picea; ore, coxis, metasterno, atque apice abdominis flavis.

Habitat Americam septentrionalem, in provincia New York capta.

Obs. In loco "*fuscipennis*," sæpe a D. Motschulsky atque aliis usitata, nomen "*cursitans*" adhibendum censeo.

Trichopteryx crassicollis, n. sp. Pl. V. fig. 4.

T. nigra, oblonga, convexior, tuberculis sat magnis ornata, interstitiis rugosis, pilis brevibus fulvis vestita. Long. corp. $\frac{5}{8}$ lin.

Caput magnum, prominulum; antennis læte flavis.

Pronotum latum, convexissimum, vix postice dilatatum, lateribus valde rotundatis, tuberculis sat magnis fere transverse seriatim dispositis ornatum; margine posteriore depresso, leviter marginato, sinuato, angulis parum productis.

Scutellum magnum, triangulare, fortiter asperatum.

Elytra oblonga, haud postice attenuata; piceo-nigra, apicibus dilutioribus, fere rectis.

Abdomen sat exsertum.

Pedes læte flavi.

Subtus nigra; ore, coxis atque apicibus metasterni et abdominis flavis.

Habitat Americam septentrionalem, in Louisiana exemplo unico capto.

Differt a *T. grandicollis* forma oblonga, setis erectis nullis, elytris longioribus, atque colore obscuro-nigro.

Trichopteryx fascicularis, Herbst. Pl. V. fig. 5.

Trichopteryx intermedia, Gill. *T. abrupta*, Haldeman?

T. nigra, sat lata, pilis brevibus pallidis vestita, tuberculis elevatis interstitiisque alutaceis ornata. Long. corp. $\frac{1}{2}$ – $\frac{3}{4}$ lin.

Caput sat breve, latum, parvum; antennis flavis, ad apices fuscescentibus.

Pronotum postice dilatatum, lateribus parum rotundatis, tuberculis parvis, interstitiis profunde alutaceis, ornatum; margine posteriore sinuato, angulis valde productis, elytrorum humeros tenaciter amplexis.

Scutellum magnum, triangulare, asperatum.

Elytra subquadrata, in maribus parum attenuata, alutacea, confertim asperata, apicibus aliquantum rotundatis, anguste pallidis.

Abdomen parum exsertum.

Pedes læte flavi.

Subtus nigra, alutacea, coxis piceo-testaceis.

Habitat Americam septentrionalem.

Hanc speciem sub nomine *T. abrupta* a D. Haldeman descriptam esse opinor, sed e descriptione tam curta et imperfecta quomodo adjudicare haud sciam. Certum est, quod descriptio illius ad *T. fascicularem* omnino referre videtur.

Trichopteryx discolor, Haldeman. Pl. V. fig. 6.

T. nigra, haud nitida, elytris pallide testaceis, depressa, subparallela, tuberculis sat magnis, aliquantum remotis ornata, interstitiis profunde alutaceis, pilis quam brevissimis vestita; pronoto minime dilatato. Long. corp. $\frac{3}{8}$ – $\frac{1}{2}$ lin.

Caput magnum, latum; antennis longioribus, pallidis, ad apices fuscescentibus.

Pronotum ad basin parum dilatatum, lateribus valde deflexis, angulis posticis productis; nigrum, angulis posticis dilutioribus.

Scutellum magnum, triangulare, nigrum.

Elytra depressa, oblonga, testacea, lateribus atque angulis apicalibus externis plus minusve nigrescentibus.

Abdomen nigro-piceum, sat exsertum.

Pedes pallide testacei.

Subtus picea, ore et coxis testaceis.

Habitat Brasiliis.

Trichopteryx sericans, Heer. Pl. V. fig. 7.

T. nigra, haud nitida, oblonga, aliquantum depressa, pilis fulvis vestita, tuberculis elevatis, interstitiis profunde alutaceis, ornata. Long. corp. $\frac{3}{8}$ – $\frac{1}{2}$ lin.

Caput modicum; oculis vix prominentibus; antennis piceis.

Pronotum postice latius, margine posteriore leviter sinuato, levissime reflexo, angulis aliquantum productis.

Scutellum magnum, triangulare, asperatum.

Elytra quadrata, sat depressa, capite atque pronoto parum longiora,

confertim asperata, obscure nigra, apicibus dilutioribus, fere rectis.

Abdomen parum exsertum, nigrum.

Pedes læte flavi.

Subtus nigro-picea.

Habitat Americam septentrionalem.

Exempla Europæa antennis fere nigras habent, sed ab illis insecta prope lacum Superiorem capta haud aliter differunt.

Trichopteryx Montandonii, Allibert. Pl. V. fig. 8.

Trichopteryx similis, Gillmeister.

T. nigra, nitida, convexa, oblonga, sparse et levissime tuberculata, interstitiis alutaceis, pilis griseis vestita. Long. corp. $\frac{3}{8}$ lin.

Caput magnum, latum; oculis sat magnis, haud prominentibus; palpis atque antennis flavis, his ad apices fuscescentibus.

Pronotum parum postice latius, valde convexum; margine posteriore sinuato, levissime marginato, angulis sat productis.

Scutellum magnum, triangulare, sat profunde asperatum.

Elytra oblonga, capite atque pronoto parum longiora, multo profundius ac distincte seriatim asperata, piceo-nigra, ad suturam dilutiora, apicibus summis albidis, parum rotundatis.

Abdomen sat exsertum.

Pedes flavi.

Subtus nigra, coxis flavis.

Habitat Brasiliæ, exemplo unico capto.

Trichopteryx ambigua, Matthews, Ent. Mag. 1865.

Pl. V. fig. 9.

T. fusca, convexa, latior, tuberculis distinctis interstitiisque profunde alutaceis ornata, pilis longioribus pallidis vestita; pedibus atque antennis robustis. Long. corp. $\frac{3}{8}$ lin.

Caput magnum, breve, latum; oculis modicis, haud prominentibus; antennis nigro-piceis.

Pronotum haud postice dilatatum, lateribus aliquantum rotundatis; margine posteriore leviter sinuato, leviter marginato, angulis minime productis; in maribus ad basin aliquantum contractum.

Scutellum magnum, triangulare, confertim asperatum.

Elytra quadrata, haud postice attenuata, confertim asperata, aut potius tuberculata, interstitiis distincte alutaceis; apicibus minime rotundatis.

Abdomen sat exsertum.

Pedes quam robustissimi, læte flavi, femoribus obscuratis.

Subtus fusca, coxis flavis.

Habitat Americam septentrionalem, exemplis multis in provincia New York captis.

Hæc species cum multis aliis sub nomine *T. pumila* comprehendi

videtur: quamquam D. Erichson ait, quod *T. pumila* tarsos anticos dilatatos habet, atque D. Gillmeister *T. simili* eam comparat, nihilominus exempla hujusce speciei cum *T. simili* aliisque nonnullis in una, *T. pumila*, sæpissime miscentur.

Trichopteryx aspera, Haldeman. Pl. V. fig. 10.

T. nigra, obscura, pilis brevibus griseis vestita, tuberculis sat elevatis dense oblecta, interstitiis fortissime alutaceis. Long. corp. $\frac{1}{4}$ – $\frac{3}{8}$ lin.

Caput breve, latissimum, latitudini pronoti fere æquale; oculis magnis, prominulis; antennis nigro-piceis.

Pronotum transversum, postice parum dilatatum, lateribus sat rotundatis, confertim tuberculatum, tuberculis oblique seriatim dispositis; margine posteriore leviter sinuato, angulis vix productis.

Scutellum modicum, triangulare, fortissime asperatum.

Elytra longiora, postice parum dilatata, transverse seriatim confertissime asperata, apicibus extremis albidis, parum rotundatis.

Abdomen longius exsertum.

Pedes flavi.

Subtus nigro-picea; ore, coxis atque apice abdominis dilutioribus.

Habitat Americam septentrionalem, in provincia New York nonnullis captis.

Differt ab omnibus magnitudine minore ac forma singulari pronoti atque etiam sculptura rugosa corporis.

Hæc insecta ad *T. asperam*, Haldeman, referenda rugosum corpus indicat, sed descriptio ejus adeo imperfecta est, quod nescio, annon ad eam re vera pertineant.

Micrus flicornis, Fairmaire. Pl. V. fig. 11.

M. nigro-piceus, angustus, elongatus, tuberculis parvis confertim oblectus, pilis longioribus albidis vestitus. Long. corp. $\frac{3}{8}$ – $\frac{1}{2}$ lin.

Caput magnum, pronoti latitudini fere æquale; antennis flavis, elongatis.

Pronotum antice dilatatum, pone medium contractum, ad basin iterum parum dilatatum, lateribus ac basi leviter marginatis; margine anteriore et posteriore fere rectis, angulis anticis obtusis, posticis acutis.

Scutellum parvum, triangulare, asperatum.

Elytra longiora, lateribus subparallelis, truncata, apicibus minime rotundatis, margine summo albido, transverso ordine leviter confertimque asperata, capite et pronoto parum dilutiora.

Abdomen elongatum, valde obtusum.

Pedes longiores, læte flavi.

Subtus piceo-niger; ore, coxis atque apice abdominis dilutioribus, femoribus obscuratis.

Habitat Americam septentrionalem, etiam in Brasiliis captus.

Rarissima in Europa, in America communis species videtur.

Nephanes læviusculus, n. sp. Pl. V. fig. 12.

N. fusco-castaneus, nitidus, in capite ac pronoto annulis minutis, distinctis, umbilicatis, seriatim ornatus, pilis albidis vestitus. Long. corp. $\frac{5}{16}$ lin.

Caput magnum, longitudini et latitudini pronoti fere æquale; oculis magnis, prominentibus; antennis piceis, ad basin flavis, articulo ultimo elongato-acuminato.

Pronotum transversum, lateribus minime rotundatis; margine posteriore recto, angulis obtusis.

Scutellum modicum, triangulare, leviter asperatum.

Elytra longitudini capitis atque pronoti fere æqualia, profundius asperata, ad apices dilatata, apicibus sat rectis, angulis externis obtusis.

Abdomen sat exsertum, castaneum.

Pedes flavi.

Subtus pallide castaneus.

Habitat Americam septentrionalem, in Louisiana exemplo unico capto.

Differt a N. abbreviatello magnitudine majore, sculptura eximia, pronoto minus rotundato, elytris multo longioribus, atque articulo ultimo antennarum elongato acuminato.

Ptilium Bollani, Mannerheim. Pl. V. fig. 13.

Ptenidium Canadense, Le Conte.

P. oblongum, nigrum, haud nitidum, alte confertimque verrucatum sive tuberculatum, pilis albidis vestitum. Long. corp. vix $\frac{5}{16}$ lin.

Caput magnum, fronte rotundata; ore sat producto; oculis magnis, prominentibus; antennis piceo-nigris.

Pronotum transversum, vix capite longius, parum postice latius, lateribus parum rotundatis; margine posteriore sinuato, angulis obtusis.

Scutellum sat magnum, triangulare, profunde verrucatum.

Elytra ovata, pronoto vix latiora, capite atque pronoto sesqui longiora, profunde verrucata, apicibus summis obtusis, aliquantum dilutioribus.

Abdomen haud exsertum.

Pedes fusco-testacei.

Subtus nigrum, ore testaceo.

Habitat Americam septentrionalem, prope lacum Superiorem captum.

Ptenidium macrocephalum, Nietner. Pl. V. fig. 14.

P. læte castaneum, valde convexum, nitidissimum, foveis quatuor ingentibus ad basin pronoti profundissime impressum. Long. corp. $\frac{3}{8}$ lin.

Caput magnum, latum, punctura sat parva prope oculos utrinque impressum; antennis flavis, clava fusciscente; oculis sat magnis.

Pronotum longitudini et latitudini capitis fere æquale, ante medium

P.S.—Since this paper has been in the hands of the printer, entomology has lost one of its brightest ornaments by the death of my lamented friend Dr. Schaum. It may be long before the gap which his masterly intellect has left in the literature of our favourite science can be repaired; it must be long before entomologists can forget the energetic leader and kind friend to whose memory I now humbly offer this short testimony of my regard.

Matthews, A. 1866. "XVII.—Descriptions of several species of Trichopterygidæ found by Dr. H. Schaum in various parts of North America and Brazil." *The Annals and magazine of natural history; zoology, botany, and geology* 17, 141–149.

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