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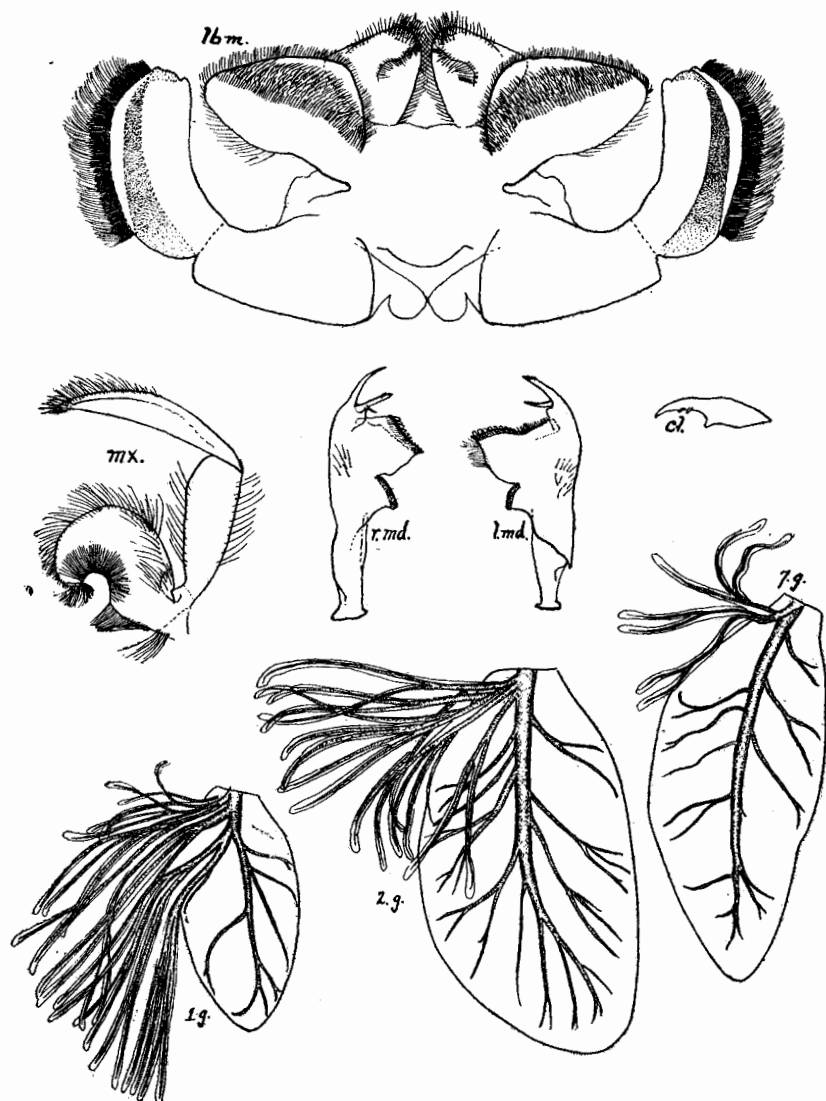
THE NYMPH OF CINYGMA INTEGRUM AND DESCRIPTION  
OF A NEW HEPTAGENINE GENUS\*

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The species, *integrum* Eaton, described from material collected in Washington and Oregon states, was designated by Eaton as the genotype of *Cinygma*. I have already (1926, Can. Ent. LVIII, 302) recorded the capture of adults of this species in the Coast range of British Columbia and at the time expressed some doubt as to whether all the species at present included in this genus were strictly congeneric. Since nymphal structures have been recognized by a number of recent workers as of great importance in furnishing distinguishing characters in the Heptagenine genera it was with considerable interest that I discovered among material collected in the Hope Mts., B. C. in 1932 by my assistant, Mr. A. N. Gartrell, a bred female adult of *integrum*, together with its nymphal exuvia, preserved in alcohol. A study of this exuvia soon convinced me that in the nymphal gills and mouth-parts there are excellent and in part unique structural details which should at once establish not only the validity of the genus but also its limitations and position in the group of allied genera.

As far as can be judged from the single well-preserved exuvia the nymph is deep brown in coloration, about 12 mm. long (exclusive of setae) and superficially very similar to nymphs of the genus *Heptagenia*. There are three setae; the gills are, as usual, seven in number, deep smoky in color, oblong-ovate, with a well-developed bunch of filaments on underside at base and a strongly defined tracheal system, the first gill is decidedly smaller than the others and there is no trace of any ventral extension of either the first or seventh gill-pair, such as is found in *Iron* or *Rhithrogena*; the postero-lateral edges of the abdominal segments are not extended into spine-like projections and the only abdominal maculation on each segment consists of a pair of fine, pale, dorsal, longitudinal dashes, followed by pale dots, the whole resembling an exclamation mark. The legs are normal; the femora slightly spiculate on dorsal surface and with a row of moderately long setae on the upper edge, they show irregular pale bands at middle and apex, the former being continued towards base by a pale streak; the tibiae are subequal in length to the femora and banded with pale before middle and at apex; the tarsus shows a darker apical shade and the claw has a strong median projection on the ventral side with a couple of small, subapically placed teeth. The mouth-parts (see figure 2), while they show relationship to *Heptagenia*, notably in the labial and maxillary palpi, possess other features which are quite unique; the maxillae are shaped quite differently from those of any other of our American Heptagenine genera, as a reference to the figure will show, and each of their opposing edges contains a semi-circular excavation bordered with a circlet of long hairs which would seem to have the function of a strainer of some sort; the mandibles show relation to *Heptagenia* in the shape of the fangs but possess, basad of the molar region proper, opposed lobes of a heavily chitinized nature the presence of which I have not noted in allied genera; the triangular nature of the inner lobes of the labium is characteristic and to a lesser extent the shape of the apical portion of the labial palpi.

\*Contribution from the Division of Systematic Entomology, Entomological Branch, Department of Agriculture, Ottawa.



Structural details of the nymph of *Cinygma integrum* Eaton. lbm. labium; mx maxilla; r. md. right mandible; l. md. left mandible; cl. claw; 1g, 2g, 7g, first, second and seventh gills.

Based on the above details I believe the genus should be restricted to the two species, *integrum* Eaton and *lyriformis* McD.; of this latter species only the adult is known as yet but both pattern and genitalic structure point to a close association between the two. To my mind *Cinygma* is an offshoot from *Heptagenia*, separable from it in the adult by the much greater length of the first tarsal joint of the foreleg in the male and in the nymph by the above-mentioned differences in the mouth-parts.

If we except for the present the species *geminatum* Eaton, based on female specimens the identity of which is still doubtful to me, I believe that for the remaining species now included in the genus, viz.: *atlantica* McD., *minus* Eat., *par* Eat., *confusa* McD., *hyalina* McD., *ramaleyi* Dodds and *tarda* McD. a new generic term becomes necessary, for judging by the structural details of those nymphs known to me (*atlantica*, *confusa*, *ramaleyi*) and some others doubtfully associated (*par*, *mimus*, *tarda*) this group bears the same relationship to *Rhithrogena* that *Cinygma* does to *Heptagenia*. I characterize therefore the new genus as follows:

#### ***Cinygmula* gen. nov.**

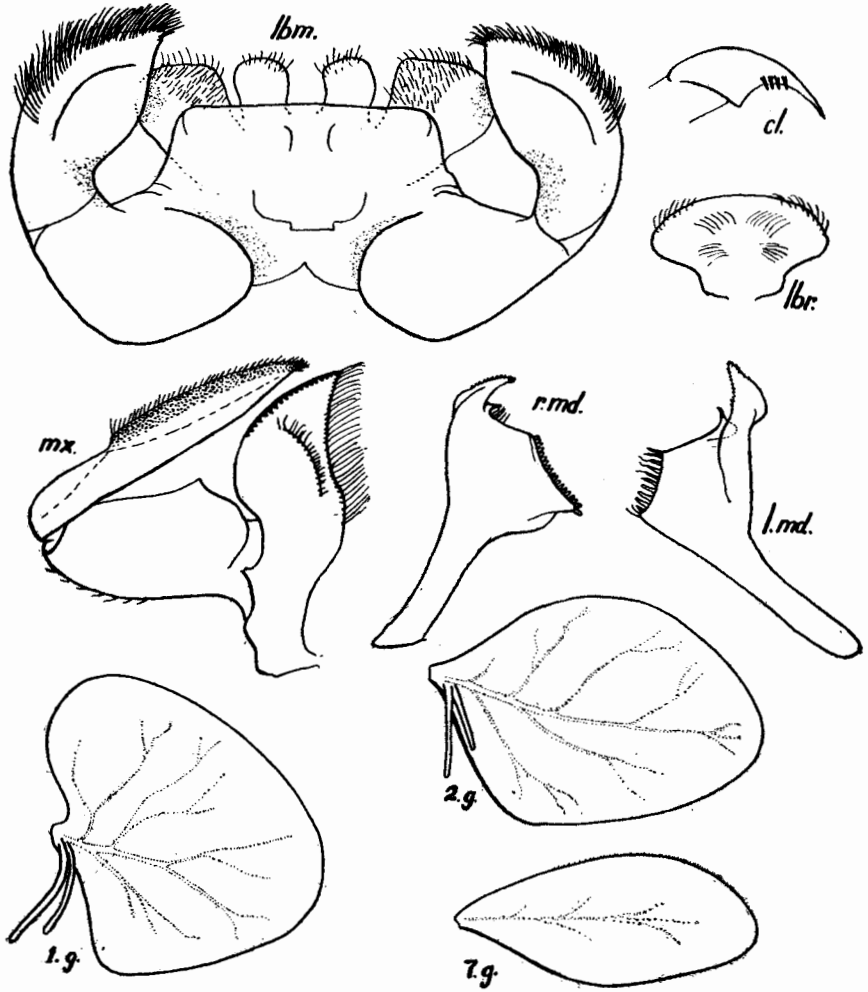
*Nymph* with three setae. Gills, as usual, on first seven abdominal segments, pale, with only slight, indistinct tracheation and with the basal filaments reduced to one or two on the anterior gills; gill of segment I largest, heart-shaped, the ventral section tending to be slightly enlarged but not nearly to the extent found in *Rhithrogena*; remaining gills ovate, with that of segment VII smallest and oblongovate. Mouth-parts distinctly reminiscent of those of *Rhithrogena*, notably the mandibles and the maxillary palpus (see figure 3). Separable from both *Rhithrogena* and *Cinygma* on gill-structure and from the latter on structure of mouth-parts.

*Adult*. Separable from *Rhithrogena* on account of the much greater length of the first foretarsal joint in the male, which is very similar to that of *Cinygma*. Male genitalia with penes more or less rod-like, separate except at base, with stimuli placed subapically and frequently with lateral spine. (In *Cinygma* the penes are joined almost to apex as in *Heptagenia* and the stimuli are minute and situated near base.)

*Genotype*, *Ecdyurus ramaleyi* Dodds.

The nymph of *ramaleyi* has already been described by Dodds (1923, Trans. Am. Ent. Soc. XLIX, 101) and the adult genitalia figured (Pl. VIII, fig. 9). A figure of the nymph is given in Ecology, V, Pl. II, fig. 10, 1924. The figures I give in the present article add supplementary details of structure in gills and mouth-parts.

In conclusion it might be well to mention two papers which have appeared recently, dealing ostensibly with nymphs of *Cinygma* species. The first of these by Dr. Needham (1927, Can. Ent. LIX, 133/6) was based on a misassociation (as acknowledged to me by Dr. Needham *in litt.*) of adults of *mimus* Eaton with true *Rhithrogena* nymphs, probably of the species *doddsi* McD. This led to the wrong conclusion that the genus *Cinygma* should be sunk to *Rhithrogena*. The second paper by F. P. Ide (1930, Can. Ent. LXII, 42/45) dealt with the nymph of *Cinygma bipunctata* McD., a species which now, due to Ide's nymphal studies, has been correctly removed (1930, Can. Ent. LXII, 229) to the genus *Arthroplea* Bgtssn.



Structural details of the nymph of *Cinygmula ramaleyi* Dodds.