

EXPLANATION OF PLATE 3.

The Oak TINGIS, *Corythuca arcuata* Say.

- Fig. 1. Side view of egg.
- Fig. 2. Top view of egg.
- Fig. 3. Dorsum of first instar.
- Fig. 4. Spine from lateral margin of first instar.
- Fig. 5. Dorsum of second instar.
- Fig. 6. Dorsum of third instar.
- Fig. 7. Dorsum of fourth instar.
- Fig. 8. Spine from lateral margin of fourth instar.
- Fig. 9. Dorsum of fifth instar.

SOME HITHERTO UNKNOWN NYMPHS OF ODONATA FROM
NEW MEXICO.

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During the year 1902, dragon-fly nymphs were collected in three New Mexico localities, each of which yielded material of interest.

(A.) *Las Vegas Hot Springs*, 6709 ft. alt.

A few years ago some specimens of *Hyponeura lugens* were collected at Las Vegas Hot Springs, and upon investigation it appeared that the species occurred there as a permanently established and tolerably numerous colony. This excited some surprise, as the place is hundreds of miles from the nearest previously-known locality for *Hyponeura*, and is in the Transition zone, where the insect was hardly expected to occur. That the colony was really an isolated one appeared probable not merely from the absence of other New Mexico records, but from the fact that we could not find the species in other localities, such as the Arroyo Pecos, which were very prolific in agrionines. The search for nymphs of *Hyponeura* was at first

¹ The descriptions of the nymphs are by Dr. Needham. The material was collected by Mr. and Mrs. Cockerell, and Mr. Cockerell is responsible for the matter relating to localities, etc.

unsuccessful. The hot springs themselves are apparently too hot for insect life though they contain a variety of algae¹ (*Zygnema cruciatum*, *Oscillaria froelichii viridis*, *O. splendida*, *Stigeoclonium tenue*, *Ulothrix speciosa*, *Zygogonium parvulum*, *Beggiatoa alba marina*, *Oedogonium* sp., *Spirogyra* sp., *Tetraspora* sp., and *Nostoc* sp.). The temperature of the water was found to be 121° Fahr. Search was next made in the little streams running from the hot springs, and here nymphs were found, but they proved to be referable to some unknown species of *Argia*. No further investigations were made for several months, but in September *Hyponeura* nymphs were at last found in abundance, clinging to stones in the Gallinas River at Las Vegas Hot Springs. The place where they occurred is just where the hot water runs into the river, and the river is perceptibly warmed in consequence. It does not seem impossible that this condition has permitted the existence of the *Hyponeura* colony (derived in the first instance perhaps from the eggs of some wandering individual), the normal waters of the surrounding region being too cold for the species. At the same place were found larvae of *Anopheles pseudopunctipennis* Theobald, determined by Dr. L. O. Howard who informs us that the species was lately described from Grenada, and is new to the United States, but adds that there is a single specimen in the U. S. Nat. Mus., collected by Belfrage in Texas and hitherto overlooked. Larvae have been sent to Dr. H. G. Dyar, who finds them different from true *A. punctipennis*. There was also collected a leech, *Erpobdella punctata* Leidy (det. J. Percy Moore), apparently new to the fauna of New Mexico. The *Hyponeura* nymphs were not bred to the adult stage, but as the generic characters can be seen in the nymphs, it is safe to assume that the species is the same as that caught flying in the same immediate locality. If the above suggestions concerning the origin and character of the HYPONEURA colony are correct, we may look for signs of modification tending towards the establishment of a new race or species. At present it is not possible to compare sufficient numbers of specimens from different localities to determine whether such modification exists, either in average or absolute characters.

HYPONEURA LUGENS Selys.

A number of nymphs in alcohol, obtained from the Gallinas River, Las Vegas Hot Springs, September, 1902. Apparently none of the specimens are fully grown, but they are large enough to show the main features of the venation of the adult in their developing wings, and thus to render certain their generic determination.

Length 14 mm., gills 5 mm. additional; abdomen 7.5 mm., hind femur 3.5 mm., width of head 3.5 mm., of abdomen 2.5 mm.

Body short, stout, smooth. Head depressed, widest across the rear of the large laterally well-rounded and prominent eyes. Antennae 7-jointed, with the suture between the last two

¹ Collected by Mrs. Cockerell; determined by Miss Smith of the University of Nebraska.

segments feebly developed in the younger specimens, the ratio of length of segments from the base outward being 1: 1.3: 2: 1.5: 1: .8: .5. Hind angles of the head prominent, obtusely rounded, scurfy pubescent, with a wide but shallow notch on the hind margin between them. Labium short, the hinge reaching posteriorly only so far as the middle of the prothorax. Mentum with a very prominent, entire median lobe, and with no mental setae. Lateral lobes short and stout, each with a strong arcuate movable hook and a single weak raptorial seta just before base of hook. The end hook is cut off from the inner margin by a feebly developed notch and above it on the end of the lateral lobe is a second similar but somewhat smaller hook, that is denticulate on its external margin.

Prothorax short, widened and thickened toward its rear margin. Legs short, stout, thinly fringed with hairs. Wing cases (in the oldest of these immature specimens) reaching only the middle of the 2d abdominal segment.

Abdomen cylindric, the segments of nearly equal length, except at ends where somewhat shorter, the 10th segment excised on mid-dorsal margin. Gills oblong, widest just beyond the middle, suddenly contracted to both ends, the superior a little shorter than the laterals, all subinflated in the basal half, and with very prominent lateral carinae along the axis.

Color pattern unusually well developed. General color greenish brown, paler below and on sutures: a mid-dorsal row of pale triangles on the abdominal segments, one on each segment, and a pale line each side, and a row of oblique pale streaks in the darker color of the side margin. There is a blackish lateral band extending from the rear of the eyes along the sides of the head and prothorax. All the femora bear two distinct broad rings of blackish brown, the distal one being the more prominent, the gills are blackish, white tipped, and each shows an imperfect pale subapical transverse band starting inward from the opposite margins and of different extent in different specimens. The depth of color varies greatly with remoteness from time of moulting, but the general pattern is quite apparent in all but the most recently moulted.

Material more recently collected from the same place on March 21st, 1903, includes some larger specimens measuring in length of body 16 mm., having wing cases reaching the middle of the 3d abdominal segment.

This nymph is at once distinguished from our other known agrionine nymphs by a very primitive character: the possession of triquetral gills, having swollen base and thick lateral carinae. Of all the nymphs of Odonata hitherto made known they are most like the fossil nymphs of the genus *SAMARURA* described by Brauer, Redtenbacher, and Ganglbauer in the Memoirs of the Imperial Academy of St. Petersburg, vol. 36, 1888, from the Jura formation of East Siberia. The gills are very similar. Nymphs of *HYPONEURA* agree closely with those of the genus *ARGIA*, differing chiefly by their much greater size, shorter labium, absence of well developed raptorial setae, and thicker gills. The species of *ARGIA* from streamlets of warm water above mentioned has triquetral gills, possessing strong lateral carinae, but they are thinner and more pointed than the gills of *HYPONEURA* nymphs. In *Argia putrida* Hagen, which clings to the rocks in rapid streams or on wave beaten shores, there are feebly developed lateral carinae at the base; but the other species

of ARGIA that live in quiet waters and come into direct competition with nymphs of other genera, have the gills quite thin and flat.

(B.) *The Arroyo Pecos, near Las Vegas.*

The Arroyo Pecos (by no means to be confused with the Pecos River) is a gully to the east of Las Vegas, where a small stream cuts through the fossiliferous Pleistocene beds, and even into the underlying Cretaceous shales. The stream is small and the water is so alkaline that drivers of vehicles crossing it will not usually allow their horses to drink. Here and there are pools and marshy places. On June 7 search was made for Odonata in a marshy place in the arroyo, and along the borders of an artificial pond not far off. Agrionines only were observed breeding, but these were exceedingly numerous. The males were holding the females by the neck with their abdominal appendages, while the latter oviposited in the water. At the same time nymphs were leaving the water, and several placed in paper bags gave forth adult flies. It would seem that either the hatching season is quite prolonged, or else the ovipositing occurs very shortly after emergence. Three species were represented, as set forth below. *Enallagma civile* was very abundant, but *Ischnura perparva* was scarcely less numerous, while *I. damula* occurred in fair numbers around the pond.

ENALLAGMA CIVILE Hagen.

This widely distributed North American ENALLAGMA was bred from nymphs collected at Arroyo Pecos, Las Vegas, N. Mexico on the 7th of June, 1902. The nymphs of this genus are so much alike that it is hardly worth while to repeat the detailed description given in the Bulletin of the New York State Museum. It will be sufficient here to state the more distinctive characters of this species. The immature stages were unknown at the time the above mentioned Bulletin was written.

Length 19–20 mm., gills 6 mm. additional. Form as in others of the genus. Gills without color pattern save for scanty pigmentation along the larger tracheae. Mental setae of the labium four each side, the innermost small, but half as long as the others. Lateral setae 5. End of the lateral labial lobe with end hook as usual, but above it on the margin are three larger followed by three smaller, obsolescent teeth, the latter covering the outer angle.

ISCHNURA PERPARVA Selys.

This little western species was also bred from nymphs collected at Arroyo Pecos, Las Vegas, N. Mexico, on June 7, 1902. Its nymph agrees closely with

that of other members of the genus in general characters as stated in the above cited Bulletin. Its more distinctive characters are the following:—

Length 11 mm., gills 4 mm. additional. Gills plainly colored, a little darker along the axis, but without spots or bands. Mental setae of labium four each side in an equal uniform series; lateral setae 5. On the end of the lateral lobe above the end hook are three distinct teeth, and the obliquely truncated outer angle is obscurely denticulate.

Two pairs of *Ischnura damula* Calvert (recently described in Biol. Centr. Amer., ♂ only) were taken at Arroyo Pecos on June 7 along with the above described forms. Both females are old and pruinose blue. They measure in total length 27 mm., abdomen 20 mm., hind wing 15 mm. There is no ventral spine on the 8th abdominal segment. The stigma is distinctly smaller (smaller by about one third) in the hind wing than in the fore. The hind margin of the prothorax is slightly concave on either side of the dorsum, produced backward in the middle and divided there by a minute median notch. The nasus is metallic green, but the top of the head and thorax, the upper surfaces of the femora, and the whole dorsum of the abdomen (save for invading streaks of yellowish on the sides of the 2d segment) are blackish pruinose.

(C.) *Dimmitt Lake, near Roswell.*

On the east side of the Pecos River, near Roswell, is a line of red bluffs consisting of impure gypsum. At the foot of these bluffs is a series of small lakes, which are so deep as to be popularly reputed "bottomless." These lakes are so strongly impregnated with salts that the water is hardly suitable for drinking purposes. Along their margins dragon-fly nymphs may be found, and dragon-flies (mostly libellulines) were observed to be very numerous.

The identification of the species of *Dythemis* is more or less uncertain. Captain Pope collected on the Pecos River *D. velox* Hag., *D. fugax* Hag., and *D. mendax* Hag. *Dythemis* (now *Brechmorhoga*) *mendax* may be eliminated because its venation does not agree with that of the nymphal wings: as between *D. velox* and *D. fugax*, judging by size alone, the nymphs should belong to the latter, rather larger species, but the former only was collected at the same time and place.

In Proc. Davenport Acad. Sci. vol. 9 (1902), p. 51, it is inferred that Pope collected his material at very different localities above the river, since he obtained both *Melanoplus bivittatus* and *M. differentialis*, which inhabit different life-zones. However, in 1902 it was observed that these two grasshoppers do actually occur together at Roswell. As it is not very likely that their ranges overlap very much,

it thus seems likely that Pope's collections, if all from one place, were from the vicinity of the present town of Roswell, rather than from Lat. 32° (the present boundary between New Mexico and Texas), as Hagen indicates. In all probability, however, the collections were made in several places.

The following species of Odonata were collected at the same place and time as the nymphs described below: *Dythemis velox* Hagen, *Libellula odiosa* Hagen, *Plathemis subornata* Hagen, *Mesothemis collocata* Hagen, *Enallagma civile* Hagen, *E. basidens* Calvert, *Hetaerina americana* Beauv., and a single undeterminable female of a species of ARGIA. Of these, the first five agree perfectly with the descriptions of the types, sent originally by Captain Pope from this same locality.

DYTHEMIS SP.?

Four cast nymphal skins collected at Dimmitt Lake near Roswell, N. Mex., in August, 1902. These constitute a valuable discovery, since no nymphs of this genus or any of its immediate neighbors in the system have been made known hitherto. The generic determination is possible because the venation of the adult is well marked in many important particulars upon the empty wing sheaths.

Length 20 mm., abdomen 12 mm., hind femur 6 mm., width of head 6 mm., of abdomen 7 mm.

Body stout, nearly smooth, depressed. Head widest behind the middle across the rear of the broad eyes, abruptly sloping behind the eyes to the nearly straight, scurfy pubescent hind margin. Antennae slender hardly as long as the head, sparsely hairy toward the tip. Eyes directed antero-laterally. Labium wide, thin; hinge reaching posteriorly as far as the mesothorax. Mentum with a very prominent and broad median lobe whose margin is entire and nearly bare. Mental setae about 12 each side, the outer seven stronger. Lateral lobes broad, lateral setae 10, with a very minute axial seta or spinule at base. Teeth on opposed margins of lateral lobes nearly obsolete, but armed with about four graduated spinules each; at the inner angle are a number of scattered stronger marginal spinules. Movable hook slender and setiform, nearly straight to the incurved tip.

Legs slender, thinly hairy externally. Wing cases reaching posteriorly to the apex of the 6th abdominal segment.

Abdomen triquetral, with sharp lateral margins, the sides nearly parallel except at the ends, abruptly truncated in the rear, hardly narrowed before the 9th segment. Lateral spines on segments 8 and 9, straight and sharp, with finely spinulose external margins, on 8 half as long as the segment, on 9 full as long as the segment. Dorsal hooks on segments 3-9, slender and straight and strongly directed posteriorly, longest on segment 7, where as long as that segment, diminishing in length toward both front and rear: 10th segment short and included in the apex of the 9th. Appendages triquetral, hardly surpassing the level of the tips of the spines of the 9th segment; superior and inferiors equal, the laterals hardly more than half as long.



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