

These results confirm the observations carried out at constant temperature of 18°C.

Detailed description of the adult parasite is given in part II.

3. Seasonal history and incidence

At Pusa the midges (*Dasyneura lini*) first appear in the field in the beginning of January and begin to oviposit soon thereafter. The first generation of the midge is completed in two to three weeks; thus by the end of March, the pest completes about three generations. The incidence of pest is low in January but increases from the middle of February onwards. At Karnal the winters being more severe than at Pusa, the midges become active a little later. The eggs of the parasite on the other hand were abundant in the fields at Karnal from 4th February onwards.

It will be noticed from the account of the life-history given on the previous pages that the parasite is rather slow in its development, requiring about a month to complete one generation in February, but, because unlike other parasites, it is found in large numbers quite early in the season, it gets a comparatively good start over the host.

On 11th February 1937, 3,565 advanced buds of linseed collected at random from a field at Karnal (Punjab) were kept under observation. Out of these, 254 midges, and 87 parasites emerged. At an approximate rate of three midge-larvæ killed per parasite the percentage parasitisation works out as follows:—

Number of larvæ killed	=261
Number of larvæ emerged as flies	=254
	=515
Percentage parasitisation	=50·7

This is a fairly high parasitisation for such an early time in the season. It must be however noted that this figure gives the percentage of full-grown larvæ parasitised and is not based on the total number of larvæ, because buds containing or likely to contain younger larval stages of the midge were not collected. Nevertheless, it is evident that the parasite plays an important part in checking the activity of the pest. Observations taken at Sakrand (Sind) and Nagpur (Central Provinces) seem to confirm this view.

II. DESCRIPTION OF THE PARASITES

1. *Systasis dasyneuræ*, sp. nov.

Female.—Length about 1·75-2·0 mm. Bright metallic green. Head transverse, nearly three times as wide as long, somewhat wider than thorax, viewed from in front nearly rounded; frons convex, bright metallic green, densely reticulately sculptured and rugosely punctured, sparsely and finely setose; vertex rather narrow mesad, with a depression latero-caudad of the lateral ocelli; ocelli in a slightly curved line, the front one at apex of the antennal foveae and the lateral ones separated from eye borders by a distance

nearly equal to their diameter ; malar space about threefourths the height of eyes ; clypeus truncate mesad and bidentate laterad anteriorly ; left mandible tridentate and the right with an additional very minute denticle between the second and the third teeth ; eyes dark coppery red. Antennae inserted above an imaginary line drawn from the lower borders of eyes ; segments twelve ; scape reaches the front ocellus, dark above and light brown below ; pedicel very dark metallic green above and somewhat dark brown below ; ring joints 2, first transverse, second thicker and slightly wider ; funicle dark brown, with five subequal segments, the first segment about fourfifths the length of pedicel ; club twice the length of pedicel, triarticulate, first segment about one and one fourth shorter than the fifth funicle segment.

Thorax bright metallic green, closely reticulately sculptured ; mesonotum also with scattered larger, coarser, thimble-punctures ; parapsidal furrows complete, deep ; axillae subreticulately sculptured and slightly advanced into the region of the scapulae ; width of scutellum cephalad is about half the length, sculpture reticulate, without cross furrow before apex. Propodium very short and almost hidden by scutellum mesally, expanding laterally, reticulately sculptured ; with well-developed median and lateral carinae ; median carina forking at apex, the forks running along caudal margin but not specially broad ; lateral carinae at apex running strongly mesad along caudal margin and also laterad to the lateral margin but more faintly ; spiracles large, round, situated near cephalic margin in an obscure impression whose caudal margin is faintly carinate.

Fore wings hyaline, about twice as long as broad, veins dark brown ; marginal vein nearly twice the stigmal vein ; postmarginal vein nearly one and one fourth to twice the stigmal ; stigma round ; submarginal vein distinctly broken before and abruptly more slender than the marginal vein ; there are nine long setae in a straight line caudad of and parallel to the marginal vein ; marginal fringes moderately short. Hind wings not specially narrow, their margins not parallel.

Legs : all coxae and hind femora concolourous with thorax ; basal three-fourths of fore and mid femora dark coppery brown ; tibiae and tarsi yellowish brown ; terminal tarsal segment brownish.

Abdomen somewhat longer than the rest of body, conic-ovate or ovate, metallic green or bluish-green ; sculpture scaly, with sparse white pubescence denser apically than basally ; ovipositor not exerted.

Male.—Length about 1.5 mm. Except scape below and at base, antennae dark brown ; funicular segments elongated ; first funicular segment distinctly longer than pedicel but equal to the combined lengths of pedicel and the two ring joints ; second segment nearly equal to the first ; third slightly shorter ; fourth equal to third ; fifth a little over threefourths the length of fourth ; club about as long as the two preceding segments combined ; first segment of club nearly as long as the fifth funicular segment. Mesonotum with the umbilicate punctures more sparse than in the female. Propodium moderately broad mesad. Fore wings with stigma relatively larger ; surface pubescence

somewhat finer. Hind wings relatively narrow with margins subparallel. Fore and mid femora, except basal onethird, dirty brown. Hind femur concolourous with thorax. Abdomen about twothirds the rest of body, other characters as in the female.

Holotype.—One female in spirit, in Pusa collection.

Allotype.—One male in spirit, in Pusa collection.

Paratypes.—Several females and males in spirit and on pins, one female and one male mounted on slides, in Pusa collection.

Host.—*Dasyneura lini* Barnes, second instar larvae.

Coll. T. Ahmad, Karnal (Punjab), Feb.-March, 1937. Also Pusa (Bihar) ; Nagpur (Central Provinces).§

This new species resembles *Systasis varipes* Girault [1915] in size, colour, and in the lateral carinae on propodium but differs in the relatively longer post-marginal vein. From *S. insularis* Dodd & Gir. [1915], which it approaches more closely, it is readily distinguished by the differently coloured fore and mid legs and longer postmarginal vein. From *S. henrici* Gir. [1915] it differs in the tridentate mandible.

The genus *Systasis* Walk. [1834], recorded here for the first time from India, comprises fifteen species, cosmopolitan, but mostly described from Australia so far. It belongs to the tribe Tridymariae of the family Miscogasteridae and is easily recognised by twelve-jointed antennae (with two ring-joints) inserted in the middle of face, reticulately sculptured thorax with scattered umbilicate punctures, hyaline wings, marginal vein being twice the stigmal, and by the row of long setae behind marginal vein.

2. *Ecrizotomorpha*, gen. nov.

This new genus is erected for a Pirenine bred from linseed midge along with *Systasis dasyneurae*. It is readily recognised by the pubescent eye, 10-jointed antennae, triarticulate maxillary palpi, long stigmal and postmarginal veins, stout and compressed posterior tibiae and normal second abdominal tergite. From *Herbertia* Howard [1894], which it resembles in the eye pubescence and number of antennal segments, it is easily distinguished by the well-developed stigmal vein and normal second abdominal tergite. From *Ecrizotes* Forster [1861], which it approaches most closely in venation and moniliform antennae of male, it is separated by the pubescent eyes, absence of ring-joints and triarticulate maxillary palpi. It also bears a superficial resemblance to *Spathopus* Ashm. [1904] in its stout and compressed hind tibiae and short stouter fore tibiae but differs in the longer hind tibiae, pubescent eyes, absence of ring-joints and clypeus produced obtusely but not triangularly. It is not likely to be confused with the other genera of the subfamily. In Ferriere's [1934] key this genus runs to couplet number 13, but differs in the funicle having only the first and third segments transverse in female and by the prominent hypopygium and ovipositor.

The following is a full description of the genus :

Non-metallic. Head transverse, thin mesad, narrow at vertex, wider than thorax, rounded in front view. Eyes large, pubescent, not converging above. Clypeus obtusely produced anteriorly. Maxillary palpi triarticulate. Mandibles tetradentate. Antennae short and clavate in female, inserted low down in the face in level with the lower border of eyes ; segments ten; ring-joints absent ; scape long, broad, sub-compressed ; pedicel large, short ; first and third funicular segments transverse and resemble ring-joints ; club triarticulate, terminal segment armed with three spines apically ; in male funicle moniliform, closely pilose, club biarticulate, terminal segment ending in a nipple-like prolongation bearing a long spine. Thorax flat, depressed, finely scaly and with a few scattered setigerous, minute punctures. Fore tibiae stouter and shorter than femora ; in male hind tibiae longer than femora, broad, compressed apically. Wings hyaline ; submarginal in fore wings abruptly slender and broken before uniting with marginal vein ; marginal vein two-thirds the submarginal, also twice the well-developed stigmal vein ; postmarginal vein somewhat shorter than stigmal. Parapsidal furrows well developed and deep. Propodium not short mesad, smooth, ecarinate, not produced at apex ; spiracles round and cephalad ; spiracular sulci present. Abdomen in female equal to or somewhat longer than the rest of body, ovate, sessile, second tergite short ; ovipositor and its sheath exerted but not much ; in male variable, compressed and oval or elongate oval and normal, shortly petiolate, second tergite as in female ; hypopygium prominent.

Genotype.—*E. taskhiri*, sp. nov.

3. *Ecrizotomorpha taskhiri*, sp. nov.

Female.—Length varies between 0.9-1.5 mm., the average being about 1.25 mm. Black, non-metallic. Head slightly wider than long, thin at vertex and thick near mouth, with a few scattered setigerous punctures ; clypeus slightly metallic blue. Ocelli almost in a line. Scape dark reddish brown, a little over half the length of flagellum ; rest of antenna reddish brown. Pedicel much shorter than club. First funicular segment short, transverse, narrow, trapezoid, resembling a ring joint ; second funicular segment subquadrate, twice the length of first, broader ; third segment like the first ; fourth and fifth subequal to second but wider ; club three-fourths the length of scape, much wider than last funicular segment, segments equal ; terminal segment obtusely reduced and broadly rounded apically, with two long, stout, lateral spines and a much longer, slender median spine. Thorax black, scaly, with few scattered punctures or none, but setose. Veins dark brown. Except coxae and femora which are concolourous with thorax, legs light brown ; tibiae slightly darker outside basally ; knee pale.

Male.—Length varies between 1.0-1.5 mm. Black. Pedicel somewhat longer than the first funicular segment. Funicular segments subglobose, except last which is somewhat elongated. First segment of club half the length of club and one and one-fourth the last funicular segment. Hind tibiae dark brown. Otherwise as in female.

Holotype.—One female in spirit, in Pusa collection.

Allotype.—One male in spirit, in Pusa Collection.

Paratypes.—Several females and males in spirit and on cards, two females and males mounted on slides ; in Pusa Collection.

Coll. T. Ahmad, Karnal (Punjab), Feb.-March, 1937. Status unknown ; possibly a hyperparasite of *Systasis dasyneuræ*.

SUMMARY

Part I deals with the biology and morphology of *Systasis dasyneuræ*, a larval parasite of the linseed midge, *Dasyneura lini*. Eggs are laid singly inside unopened flower buds of linseed containing well-developed larvae of the midge, revealing thereby a marked sense of selection on the part of the parasite. The young grub on hatching is fairly hardy and can roam about for over twentyfour hours in search of host larvae. The last four abdominal segments of the grub are very narrow as compared to thorax and the remaining portion of abdomen, and are kept actively moving about to search and feel the host larvae. Before pupation, the grub consumes three to four larvae and this number is usually available in one linseed bud. The full-grown grub pupates within the bud with its posterior end glued to the surface of petals. At 18°C. the egg stage lasts two to three days, the grub stage twelve to fifteen days and the pupal stage eleven to fourteen days. Thus under these conditions one generation is completed in a little less than a month. The parasite seems to play an important part in controlling the pest, as unlike many other parasites it is fairly abundant early in the season. In February 1937 as many as 50.7 per cent of full-grown larvae in buds collected from Karnal (Punjab) were estimated to have been killed by the parasite.

Part II gives the descriptions of *Systasis dasyneuræ*, sp. nov. and another Chalcid *Ecrizotomorpha taskhiri*, gen. et sp. nov. The exact status of the latter is not known but presumably it is a hyperparasite on the former.

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