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OBSERVATIONS ON SEXUAL
BEHAVIOUR IN SOME AUSTRALIAN
PLATYSTOMATIDAE (DIPTERA,
SCHIZOPHORA)

by

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Observations on Sexual Behaviour in some Australian Platystomatidae (Diptera, Schizophora)

By DAVID K. MCALPINE

The Australian Museum, Sydney

Figures 1-3

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SYNOPSIS

Sexual behaviour is described in four species of platystomatid flies, viz. *Euprosopia subula*, *E. tenuicornis*, *E. anostigma*, and *Pogonortalis doclea*. The role of specific recognition marks is discussed, especially in relation to certain structural modifications.

INTRODUCTION

The comparative study of sexual behaviour in animals is important for providing information on the degree of isolation between populations and the action of natural selection on factors which affect the ability of individuals to select mates of their own species.

In the genus *Euprosopia* it has been found that many of the most useful taxonomic characters take the form of structural modifications which are restricted to one sex only. Assuming that these modifications have been evolved by natural selection acting through the phenotype on the genotype, it should be possible to ascribe a specific function or functions to each of them. Modifications possessed by one sex only are most likely to perform a role relating to sexual processes, except for certain modifications of the female, which may be connected with oviposition. Study of sexual behaviour in *Euprosopia* gives promise of providing information on the function of these taxonomic characters and their role as specific recognition marks.

Detailed observations of courtship or mating have been made previously for very few platystomatid species. Piersol (1907) has made observations on *Rivellia boscii* Robineau-Desvoidy, and Michelmore (1928) describes copulation in *Platystoma seminotionis* (Fabricius). In the former there appears to be no complex preliminary courtship and the wings of the male are vibrated during copulation (as they probably would be at other times). In both these species it seems that the male feeds the female by regurgitation while mounted. Mr. G. A. Holloway informs me that he has observed courtship and mating in *Lenophila dentipes* (Macquart) on the trunk of a smooth-barked *Eucalyptus*. He states: "I noticed several pairs before copulation facing each other for up to five minutes, but I was not able to get too close. They do not wave their wings before copulation". I have observed mating pairs of several other species of *Lenophila* on the leaves of *Xanthorrhoea* spp. Specific identifications are not yet possible for these. Mr. Holloway has observed mating of *Duomyia iris* McAlpine at Crystal Springs, Western Australia. The mounted pairs were noticed on the peduncles of inflorescences of *Xanthorrhoea* sp. I have seen numerous pairs of *Pterogenia* sp. (probably *P. pectoralis* Hendel) mating on a damp rotting log in rain forest at the West Claudie R., near Iron Range, Queensland, and a single pair on the trunk of a living tree nearby.

Diurnal mating activity is apparently normal for all the species mentioned above and also for the species of *Euprosopia* and *Pogonortalis* dealt with below. Several mating pairs of *Duomyia nigricosta* Malloch, *D. maculipennis* Hendel, *D. octoseta* McAlpine, *D. curta* McAlpine, *D. hypene* McAlpine, and *D. loxocerina* McAlpine have been taken at mercury vapour light or other light after dark under trees which were apparently inhabited by the flies. Though this clearly demonstrates nocturnal mating for these species, it is possible that sexual behaviour was initiated before dark. In general on the nights when these specimens were taken there was no moonlight.

SPECIES OBSERVED

Euprosopia subula McAlpine is very closely related to *E. macrotegularia* Malloch, the only other species of the *macrotegularia* species-group. *E. subula* ranges from the Canberra district, Australian Capital Territory, to the Pioneer River district within the tropical zone of Queensland. The known range of *E. macrotegularia* is from the Tully River to Coen, Queensland. Apparently, therefore, it is not sympatric with *E. subula*, but the intervening area between the Pioneer and Tully Rivers is not sufficiently investigated to preclude the possibility that one or both species occur within it. It is therefore possible that a small area of overlap or front of contact may exist between the two, or there may even be a short cline connecting them. There is, however, no sign of clinal variation in the distinguishing morphological characters within the known range of either species. Material of *E. subula* used in this study was obtained at the Port Hacking River, immediately to the south of the Royal National Park south of Sydney.

Euprosopia tenuicornis Macquart is one of the *tenuicornis* species-group. It is widely distributed in eastern New South Wales and Queensland as far north as Townsville. The material used in this study was collected at Centennial Park, Sydney.

Euprosopia anostigma McAlpine also belongs in the *tenuicornis* species-group and is most closely related to *E. armipes*. It lives together with *E. armipes* at Iluka in northern coastal New South Wales and Bribie Island, southern Queensland. Material for this study was obtained at Kurnell, Botany Bay, where the species inhabits the same tree-trunks as *E. tenuicornis*.

Pogonortalis doclea (Walker). Paramonov (1957) has given the distinguishing characters for Australian species of *Pogonortalis*. *P. doclea* is very widely distributed on the Australian mainland. The population of *Pogonortalis* on Lord Howe Island is regarded as a separate species, *P. howei*, because of very small but consistent morphological differences. The species *P. commoni* is also closely related, but is known from a single specimen from south-western Australia, where *P. doclea* also occurs. Specimens of *P. doclea* were observed in copula in my garden at Bronte, Sydney.

METHODS OF STUDY

Copulating pairs of all four species have been seen under natural conditions. Because of their extreme wariness it was not possible to observe details of mating behaviour of *Euprosopia* spp. in the field. When placed in glass or perspex containers on the laboratory window sill these flies appeared to behave more or less normally and could be closely observed though the glass prevented very close viewing from some directions.

For this reason oblong perspex containers (9 cm x 7 cm x 3 cm) were used in some instances where close observation under a hand lens was necessary. To prevent the flies from slipping off smooth glass or plastic surfaces, use was made of the fact that lepidopterous larvae usually leave a web of silk adhering to the substrate on which they move. The larvae of *Cephrènes augiades* (Felder) taken from ornamental palms proved the most satisfactory of the species tried. They readily spun a loose web of silk which enabled the flies to cling to the surface but did not seriously impair the transparency of the container. *Pogonortalis* is much more readily approached in the wild than is *Euprosopia* and could be closely examined with a hand lens while in copula.

Specimens of *Euprosopia* could be kept alive in the laboratory for up to three weeks when fed daily on diluted black molasses. Individuals were isolated between periods of observation, when up to four individuals of each sex were placed together.

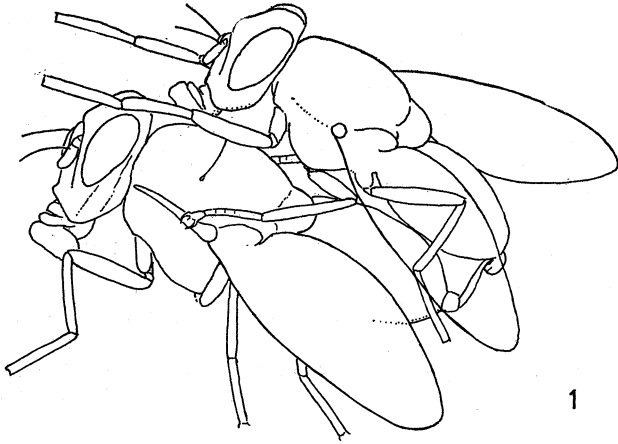
It would seem desirable to use unmated individuals, particularly females, for these investigations, but they may represent only a small proportion of those captured. Examination of long series of preserved females of *E. tenuicornis* suggests from the condition of the abdominal pubescence that *all* had been mated. As the insects cannot yet be reared in the laboratory, use of virgin females was out of the question for this species, and improbable of attainment for others. Laboratory observations on *Euprosopia* spp. show that individuals of both sexes can mate a number of times, but in each experiment only a small proportion of the specimens used showed any tendency to mate.

DESCRIPTION OF BEHAVIOUR

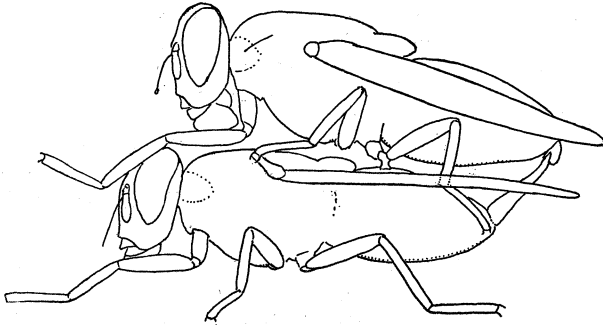
Euprosopia subula

There is contact or intermittent contact between ♂ and ♀ for up to 30 minutes before mounting. The sexes approach each other and the ♂ displays its black fore tarsi to ♀. There is no wing flicking or evident displaying of wings. At times they both hold out the fore tarsi so that they make mutual contact. No regurgitative feeding nor tapping with ♂ proboscis on abdomen of ♀ was observed. The ♂ mounts ♀ from behind and immediately takes up the following position (fig. 1): the fore legs are extended anteriorly so that the tarsi pass above and in front of the eyes of the female, and are vibrated continuously; each middle tarsus grips the tegula of the

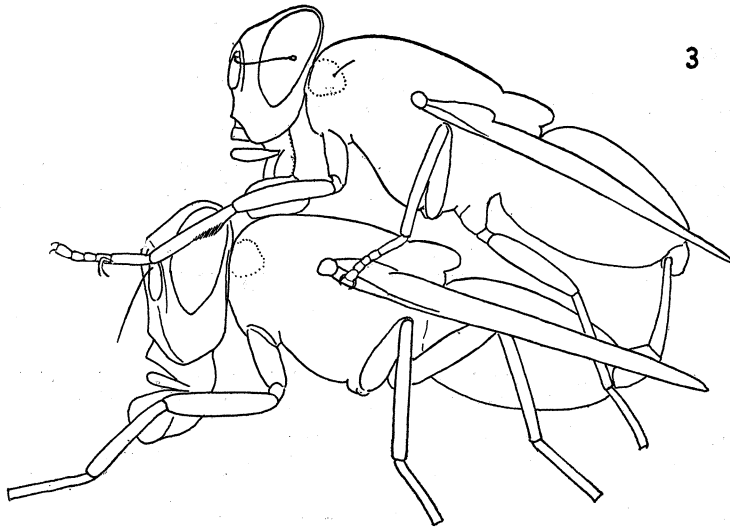
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1



2



3

Figs. 1-3.—Pairs of *Euprosopia* spp. in copula. 1, *E. subula*. 2, *E. tenuicornis* (second position of mounting). 3, *E. anostigma* (second position of mounting).

female immediately in front of the basal swelling of the latter; the hind tarsi rest on the posterior part of the preabdomen of the female; the ovipositor of the female is extended upwards to pass beneath the hypopygium of the male so that coitus appears to be achieved. The vibrations of the fore legs of the ♂ result, for a considerable proportion of the time at least, in a hammering action of the spatulate bristle of the ♂ fore femur on the anterior part of the mesoscutum of ♀. After a short period the ♂ stops vibrating the fore tarsi and prepares to feed the female by regurgitation. This may happen to the left or to the right, with corresponding reversal of the members used; the process is here described for the action taking place towards the right. The ♂ places its right fore tarsus on the substrate leaning its head over to right of head of ♀. The left fore leg of the ♂ is crooked over the head of ♀, the ♂ tibia over the ♀ postfrons, and the ♂ tarsus over ♀ antenna. The ♀ raises the right fore tarsus to touch the right side of the extended ♂ proboscis with its ventral surface. In a short time the ♀ replaces its fore tarsus on the substrate and turns its head so that its proboscis contacts that of ♂. Mutual stroking of proboscides ensues until a globule of liquid appears on the ♂ proboscis which is immediately ingested by the ♀. The pair then return to their former position with the fore tarsi of ♂ vibrating over the eyes of ♀. The feeding process may take place two or three times during each mounting. The period of mounting varied from 7 to 11 minutes in the observed instances. The ♂ dismounts when the ♀ gives restless movements of the legs or body. One pair mounted three times in succession with only short intervals between. As these individuals were confined in a small space, it is uncertain if such repeated mounting would take place in the wild. Between matings the ♀ often offered ♂ a middle or fore tarsus and there was much contact of tarsi. After separating the third time the ♀ of this pair repeatedly approached ♂, touching the wings, abdomen, and legs of latter with its fore tarsi. When ♂ retreated, ♀ pursued persistently. The ♂ flew away twice but could not totally escape ♀ in the confined space.

Euprosopia tenuicornis

Preliminaries to mounting are minimal in this species. On encountering a ♀, the ♂ walks round behind it and may briefly tap on the wings or abdomen with the proboscis before attempting to mount.

There are two distinct positions when mounted and only during the second of these is coition achieved.

The first position taken up immediately on mounting proceeds as follows: the ♂ fore tarsi are placed on the ♀ notopleural region or the anterior part of the ♀ mesoscutum and may be flicked upwards, or they may tap on the ♀ mesoscutum, and subsequently they are extended forwards and vibrated over the eyes of ♀; the mid-tarsal claws of ♂ are hooked over the anterior extremity of ♀ tegulae, the latter being pulled upwards to point in an anterodorsal direction; the ♂ hind tarsi rest on the posterior part of the preabdomen of ♀; the ♂ proboscis is tapped on the ♀ mesoscutum in some cases and not in others; ♂ may regurgitate a drop of fluid on to the labella of proboscis and then deposit the drop on the thorax of ♀, subsequently ingesting it again, but this was not observed to happen in most cases; during most of first position stage ♂ hind trochanters are held clear of ♀ abdomen with occasional contact only; rapid jerking movements of the body of ♂ take place, usually for one or few seconds before the second position is assumed; these movements cause a backward brushing of the ♂ hind trochanteral processes on tergite 3 of the ♀ abdomen. The first position may be held for as long as 10 minutes before ♀ shakes off ♂ without achieving coition. On other occasions, presumably when ♀ is more tractable, the first position stage is passed through in a few seconds and the second is taken up.

The second position is taken up at the moment coition is achieved and is continued until coition is broken. It is more or less immobile. The knee joint of the ♂ fore leg is slightly crooked over the head of ♀ so that the ♂ tibia rests loosely on the upper part of eye of ♀, the tarsus, which projects anteriorly, being occasionally flicked upwards through a small angle from its articulation with tibia; the placement of the middle and hind tarsi remain as in the first position; the ♂ hind trochanteral processes rest on ♀ tergite 3 and appear to remain quite stationary. On one occasion only during the second position stage, ♂ was observed to tap on ♀ thorax with proboscis and then regurgitate a drop of fluid on to ♀. This was later ingested by the ♂, after which the pair separated by the ♀ taking flight.

The period for which a pair remain mounted is usually 9 or 10 minutes, but was in one case 35 minutes. Often, particularly if mounting is of longer duration, the first and second positions alternate, with the second occupying the greater part of the time. The return to first position always coincides with a break in the genital coupling.

Euprosopia anostigma

The ♂ approaches ♀ from behind, touches ♀ wings with fore tarsi and ♀ tergite 5 several times with proboscis. ♀ extends ovipositor and secretes a drop of fluid on to substrate, apparently from anus. This is ingested by ♂. ♂ then attempts to mount but is often unsuccessful.

As in *E. tenuicornis* there are two different mounted positions, with coition achieved on taking up the second position and continued for its duration.

The first position taken up on mounting is as follows: each ♂ fore tarsus is placed across notopleural region of ♀ with the claws over ♀ mesopleuron, and the tarsi are repeatedly flicked upwards and forwards across and above eyes of ♀; the claws of each ♂ middle tarsus are hooked across the anterior surface of the broadened basal part of the costal vein of the ♀ wing; the distal part of the ♂ hind tibia rests on the distolateral part of preabdomen; the ♂ proboscis taps continuously on anterior part of ♀ mesoscutum; the slight jerking of the whole body of ♂ appears to cause contact between ♂ hind trochanters and ♀ abdominal tergite 3, every time the fore tarsi are flicked over ♀ eyes, but no definite stroking movements have been seen.

In the second position there is more movement than in *E. tenuicornis*; the ♂ fore tibiae are placed across the upper part of ♀ eye so that the ♀ head is held apparently quite firmly by the depressed ventral areas of the ♂ tibiae, the tarsi projecting forwards; the ♂ middle tarsi continue to cling to the extreme base of the ♀ costae; in one case the ♂ third tarsi were hooked round the apex of ♀ preabdomen on either side of ovipositor sheath subparallel and touching on ventral surface, but in other cases the placement of the hind legs was not noted; the ♂ hind coxae and trochanters are held clear of the ♀ abdomen. The following movements occur: ♂ proboscis taps almost continuously on ♀ mesoscutum; the head of ♀ jerks from side to side for all or much of the time within the grip of the ♂ fore tibiae which possibly provide the impetus for the movements; at times there are rocking movements of the pair around a vertical axis as if both were transfixed by a pin passing through the centres of their thoraces.

In apparently successful attempts at copulation the pair remained mounted for periods of from a little over one minute to 10½ minutes.

Pogonortalis doclea

Mating of this species has been observed on a grass stem, a hibiscus leaf, and other objects close to the ground in a suburban garden. Courtship and initial stages of mating have not been observed. The male mounts much further back on the female than is the case in the species of *Euprosopia*, and clings to the abdomen of the latter with the body only slightly inclined forwards from the vertical. The fore tarsi of ♂ are placed close together on tergite 2 of ♀; the middle tarsi have their knees bent up towards the wing bases with their tarsi apparently hooked on to lateral margins of tergite 2 or 3 of the female; the hind legs are bent downwards and flexed at the knees under the ♀ preabdomen immediately behind segment 5 of the latter. The wings of the ♂ remain flexed back over the abdomen. The ♂ remains immobile on the ♀ except for slight movements of the proboscis. The ♀ holds the wings more or less extended laterally and occasionally vibrates them in a horizontal plane, at the same time moving the proboscis up and down. Sometimes the ♀ walks round a little. They have been observed mounted for up to 4 minutes but it is not known how long they were mounted before observation commenced. There is probably no regurgitative feeding in the mounted position.

DISCUSSION OF RECOGNITION MARKS

The observations on mating behaviour of *Euprosopia* species provide evidence of several kinds of specific recognition marks. These include morphological and behavioural elements, but these elements often combine into a complex recognition mechanism. It would therefore serve no purpose to classify the mechanisms into strictly morphological and behavioural categories. What little has been observed in *Pogonortalis* suggests that there may be a less complex system of recognition marks in this genus. This may be due to the fact that there is apparently only a single species in most districts where this genus occurs in Australia, whereas there are often numerous species of *Euprosopia* in a single district, e.g. there are eight species in coastal areas near Sydney and about fourteen species on the Atherton Tableland.

In *Euprosopia* there are often specific differences in wing pattern but the differences between closely related species are usually small. It is doubtful if the vision of these insects is adequate for distinguishing such small differences of wing pattern as exist between *E. tenuicornis* and *E. anostigma*. As these species do not appear to display the wings before courtship, there is no evidence for recognition marks in the wing patterns of these species.

There are differences in facial markings among the species of *Euprosopia*. These tend to be fairly constant within a species group, but often differ between species groups. Individuals of *E. subula* face each other before mating so it is conceivable that they could see and recognize the facial markings. In *E. tenuicornis* and *E. anostigma* the pair do not face one another, although the facial markings are well developed in these species.

The entirely dark-coloured fore tarsi of *E. subula* contrast with those of other sympatric *Euprosopia* species (except the geographically restricted *E. remota*) which have the basal segment of the tarsus predominantly pale-coloured. The fore tarsi of *E. subula* are displayed by both sexes before mating, and in all three species of *Euprosopia* observed the ♂ places the fore tarsi near the eyes of the female for at least part of the time after mounting. It is therefore possible that the colour of the fore-tarsus is used as a recognition mark by at least some species of *Euprosopia*.

In both *E. subula* and *E. macrottegularia* there is a long fine spatulate ventral bristle on the ventral surface of the fore femur in ♂. As the above observations on *E. subula* show, these bristles tap on the thorax of the ♀ while the ♂ is mounted and is vibrating its black fore tarsi over the eyes of the ♀. This would enable both visual and tactile recognition of the ♂ by the ♀ to take place simultaneously.

In the ♂ of *E. anostigma* the fore tibia has a ventral to anteroventral longitudinal area of cuticle which is in part thrown into undulating folds and is covered with very minute, socket-based vestiture, while near the base of the tibia there is a ventral group of stout, dense black setulae. In the ♀ the area of modified cuticle is little developed and the group of black setulae is absent. As noted above, the fore tibiae of the ♂ are used during mating to grip the head of the ♀. The modifications of the tibia are undoubtedly an adaptation to enable the ♂ to obtain a firm grip. By contrast, in the ♂ of *E. tenuicornis* the fore tibiae are little modified and rest loosely on the head of the mounted ♀. Thus in these two species both the structure and manner of use of the ♂ fore tibiae could aid specific recognition of the ♂ by the ♀.

The placing of the ♂ fore tarsi across the notopleural region of ♀ in the early stages of mounting and subsequent flicking of the tarsi from this position are features of the initial stages of mounting in *E. anostigma*. This is the only one of the three *Euprosopia* species studied which has a pair of curved somewhat spatulate bristles arising from the posterior side of the distal extremity of the fore basitarsus of ♂ (also present in *E. armipes* and *E. monodon* of the same species group). It is possible that these specialised bristles impart a tactile stimulus to the ♀ during flicking which aids recognition, although the precise nature of the contact has not been ascertained.

In *E. tenuicornis* and *E. anostigma* (as in other species of the *tenuicornis* species-group) the humeral bristle is absent in the ♀, but present in the ♂. This specialised condition of the ♀ appears to be an adaptation enabling the ♂ to place its fore tarsi more firmly on the humeral-notopleural region. It is noteworthy that in the ♀ of *E. tenuicornis* the hairs on the posterior part of the humeral callus are much shortened by comparison with its ♂, or with the ♀ of *E. anostigma*. This may provide a recognition mark for the ♂. In the three available ♀♀ of *E. monodon*, which is very closely related to *E. tenuicornis*, the hairs are absent from all but the anterior extremity of the humeral callus, and its surface has a polished appearance. This condition suggests that in this species the ♂ rubs the humeral callus of the ♀ while mounted till the pruinescence has been removed from the latter.

The gripping of the ♀ with the mid-tarsal claws of the ♂ in platystomatid flies may be an essential element in maintaining the mounted position and enabling coition to proceed. In each of the four platystomatid species observed a different part of the female is gripped. In *Pogonortalis doclea* it is the lateral margins of the abdomen, whereas in the observed *Euprosopia* spp. it is always thoracic structures that are held.

The differences in the structure of the ♀ tegula in *Euprosopia* spp. are clearly adaptations to the specific mode of gripping by the ♂. In *E. subula* the very long, sub-cylindrical tegulae of the ♀ are held round the middle by the mid-tarsal claws of the ♂. In *E. tenuicornis* the tegulae of the ♀ are too short to be held in the above fashion and the ♂ tarsal claws pass over the apex of the anterior projection. In *E. anostigma* the middle tarsus of the male does not touch the ♀ tegula, but instead its claws are hooked on to the costal region of the ♀ wing. In this species the ♀ tegula is almost unmodified, being similar to that of the ♂. There are numerous species of *Euprosopia* with the tegula variously modified in the ♀, all having it practically unmodified in the ♂ (e.g. *E. macrottegularia*, *tegularia*, *remota*, *crassa*, *biarmata*, *conjuncta*). It would be interesting to compare the way in which the ♀ tegula is utilised by the ♂

in these species. If, in these insects, the ♂ is able to recognize the ♀ of its own species by the kind of supporting structure provided for its middle tarsi, then the ♀ is probably also able to recognize its own male by the position in which it attempts to place the middle tarsi.

The remarkable hind trochanteral processes of the ♂ of *E. tenuicornis* are used to brush or comb the soft downy pubescence on tergite 3 of the ♀ abdomen. No other species of the *tenuicornis* species group possesses specialised hind trochanteral armature in the ♂, or specialised pubescence on tergite 3 of the ♀. Hence these structures almost certainly provide mutual recognition marks for the sexes of this species. All of the very numerous preserved ♀ specimens of *E. tenuicornis* show evidence of this combing action by the male, suggesting that virgin females are rarely captured. The appearance of the combed pubescence on these specimens suggests that some liquid secretion contacts it during the combing process. So clear is the evidence of combing on the preserved ♀ specimens that it was possible to infer the manner of action of the ♂ trochanteral processes before observations on living specimens were made.

In *E. separata* and *E. comes*, closely related species of the *separata* species group, there is a hind trochanteral brush of dense setulae in the ♂, which is not situated on such a well developed process as in *E. tenuicornis*. Examination of the ♀ abdomen suggests that the brushes have been applied to tergite 4 in both species. In *E. separata* there is generally a shining spot on each side of tergite 4 of ♀ where the pruinescence has been completely rubbed off, probably from vigorous rubbing by the brushes on the male trochanters. In *E. comes*, in which the brushes are not mounted on tubercles, the rubbing appears to be much gentler, for though there are generally two disturbed spots on tergite 4, usually very little of the pruinescence has been removed. It appears that the method of rubbing by the male may provide a recognition mark for the females in these partly sympatric species. *E. ventralis* (*ventralis* species-group) shows a smooth rubbed area on each side of tergite 5 of ♀. In this species the tergite is possibly rubbed with some part of the ♂ hind legs, though the latter are not noticeably modified for the purpose.

The process of regurgitative feeding of the ♀ by the ♂ while mounted in *E. subula* would appear to offer possibilities for recognition marks both from the chemical and purely physical aspects. In *Rivellia boscii* and *Platystoma seminationis* (see Piersol, 1907, and Michelmore, 1928) there is also regurgitative feeding while mounted. The anal feeding of the ♂ by the ♀ in *E. anostigma* is also a habit which could involve chemical as well as physical recognition marks.

CONCLUSIONS

The observations here recorded for three species of *Euprosopia* indicate that numerous elements of the sexual behaviour pattern probably contribute to mutual specific recognition in the mating pair, both before and during mating. Recognition marks include specific morphological adaptations and specific methods of employing these. Because there are numerous comparable secondary sexual modifications in other species of *Euprosopia* (as in many other insect groups), it seems probable that many of these also serve as recognition marks or aid the functioning of ethological recognition marks.

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REFERENCES

- McAlpine, D. K. 1973. The Australian Platystomatidae (Diptera, Schizophora) with a revision of five genera. *Mem. Aust. Mus.* 15: 256 pp.
- Michelmore, A. P. G. 1928. A mating habit of *Platystoma seminationis*, F. (Diptera, Ortalidae). *Entomologist* 61: 241-242.
- Paramonov, S. J. 1957. Notes on Australian Diptera (XXV). On some new ortalids (Acalyptrata). *Ann. Mag. nat. Hist.* (12) 10: 779-781.
- Piersol, W. H. 1907. The curious mating habit of the fly *Rivellia boscii*. *Amer. Nat.* 41: 465-467.

Table 1. Comparison of mating behaviour in *Euprosopia* species

	<i>subula</i>	<i>tenuicornis</i>	<i>anostigma</i>
BEFORE MOUNTING	♂ displays black fore tarsi, ♀ does so to a smaller extent.	No display of fore tarsi.	No display of fore tarsi.
	No tapping of ♂ proboscis on ♀ wings or abdomen.	♂ taps with proboscis on ♀ wings or abdomen (sometimes).	♂ touches ♀ wings with fore tarsi and taps on ♀ tergite 5 with proboscis.
	No anal feeding.	No anal feeding.	♀ produces fluid from anus which is ingested by ♂.
MOUNTED STAGE 1 (no coition)	(Stage absent).	Initially ♂ places fore tarsi on ♀ notopleural area or anterior part of mesoscutum, then may flick fore tarsi upwards or tap them on ♀ mesoscutum. Subsequently ♂ extends fore tarsi forward and vibrates them over eyes of ♀.	♂ places fore tarsi on notopleural region of ♀ and repeatedly flicks them forward over eye.
		♂ mid-tarsal claws grip apices of ♀ tegulae.	♂ mid-tarsal claws grip costa of ♀ wing.
		♂ combs pubescence of ♀ abdomen with hind trochanters.	♂ does not comb ♀ abdomen but ♂ trochanters may contact ♀ abdomen.
		♂ does not tap ♀ thorax with proboscis.	♂ taps ♀ thorax with proboscis.
MOUNTED STAGE 2 (coition achieved)	♂ extends fore legs over ♀ head and vibrates them continuously, thus tapping ♀ thorax with spatulate bristle of femur.	♂ passively rests fore leg on head of ♀.	♂ grips head of ♀ firmly between fore tibiae and jerks it from side to side.
	♂ mid-tarsal claws grip ♀ tegula beyond base.	♂ mid-tarsal claws grip apex of ♀ tegula.	♂ mid-tarsal claws grip costa of ♀ wing.
	♂ feeds ♀ by regurgitation.	No regurgitative feeding.	No regurgitative feeding.
	♂ does not tap thorax of ♀ with proboscis.	♂ seldom taps ♀ thorax with proboscis.	♂ taps ♀ thorax with proboscis for much of time.