seminal bursa at insemination and during impregnation of the Bangkok strain of *A. aegypti*.

After being force mated with males, the terminalia of the females were dissected into cold saline before, during and shortly after sperm transfer to the spermathecae. The terminalia were placed in 2.5 percent glutaraldehyde and the material was then postfixed in 2 percent osmium tetroxide and dehydrated in ethanol and finally embedded in Epon.

The bursa is a single-cell-layered sac which has no musculature (Fig. 1). Those portions of the sac which were examined with the electron microscope were neither innervated nor tracheated. All of the cells in the sac are of the same type. The sinuous borders of contiguous cells are connected by multiple septate desmosomes. An extremely thin, finely granular basement lamina separates the bursal cells from the body cavity or hemocoele. The bursal cells possess only a few isolated cisternae of rough-surfaced endoplasmic reticulum, many well-defined mitochondria with densely packed cristae, and large Golgi complexes (Fig. 1). A large flattened nucleus with its nucleolus is located near the basal margin of each cell. Scattered, long microtubules lie parallel to the longitudinal axis of the sac. Extensive invaginations of the outer plasma membrane form clear, highly irregular saccules of extracellular space within the basal portion of the cells. Vacuoles of various sizes which often have a clear center and peripheral finely granular material are seen along the apical surface along with conspicuous, long, thin, widely spaced and irregular microvillar projections (Fig. 1). The bursa is lined with a very thin, dense, non-lamellated cuticular intima (epicuticle?). The area between the latter and the microvilli is filled with a fine flocculent material.

The semen within the bursa of the freshly inseminated female includes some spermatozoa and a large amount of accessory gland material, the latter consisting of some male accessory gland cells or their remnants, including numerous mitochondria (many with dense matrices, others of light density), various membranous cell components and fragments, as well as finely flocculent material (Fig. 2). No membrane was seen around the seminal material within the bursae examined.

The paucity of rough surfaced endoplasmic reticulum in the bursal wall immediately before, during, and shortly after transfer of semen from the bursa to the spermathecae suggests that the cells are not secretory during this critical period. The architecture of the bursal cells suggests absorbing tissue and this is in keeping with the observation that seminal materials remaining after impregnation disappear in a few days.

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A GYNANDROMORPH OF *Culex fuscocephalus* THEOBALD FROM EAST PAKISTAN[1]

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INTRODUCTION. About 100 described and over 200 undescribed gynandromorphs are known in the family Culicidae. They represent 28 species belonging to 8 genera. More than half the known mosquito gynandromorphs occur in the genus *Culex*. Kitzmiller (1953) has listed five *Culex* species with reported gynandromorphs viz; *C. coronator, C. pipiens* complex, *C. nigripalpus, C. salinarius,* and *C. theileri*. Since then four *Culex* species have been added to the list: *C. tarsalis* (Keh, 1955). *C. erythrothorax* (Blakeslee and Rigby, 1965), *C. tritaeniorhynchus* (Aslamkhan and Baker, 1969), and *C. cinereus* (Van Someren, 1969). This report describes the first gynandromorph in *Culex* (*Culex*) *fuscocephalus* Theobald.

MATERIALS AND RESULTS. During a course of study from August 1968 to July 1969, to establish the mosquito vector of rural bancroftian filariasis in Dinajpur District, East Pakistan (Aslamkhan and Wolfe, 1970), 20,915 mosquitoes belonging to 35 species were collected and identified. Of these 801 were *C. fuscocephalus*: 80 were taken resting in houses, 135 were collected on human bait and 586 were taken in cattle-biting collections. A good number of males was also collected from the houses but their numbers were not recorded. The single gynandromorph herein described was collected in the village of Akcha along with 40 other normal females on January 9, 1969, while feeding on cattle.

The gynandromorph was bipolar, the anterior end being female and the posterior male. The head and the mouth parts were typically female (Fig. 1); the hypopygium was that of a normal male (Fig. 2). Abdominal segments numbers 1

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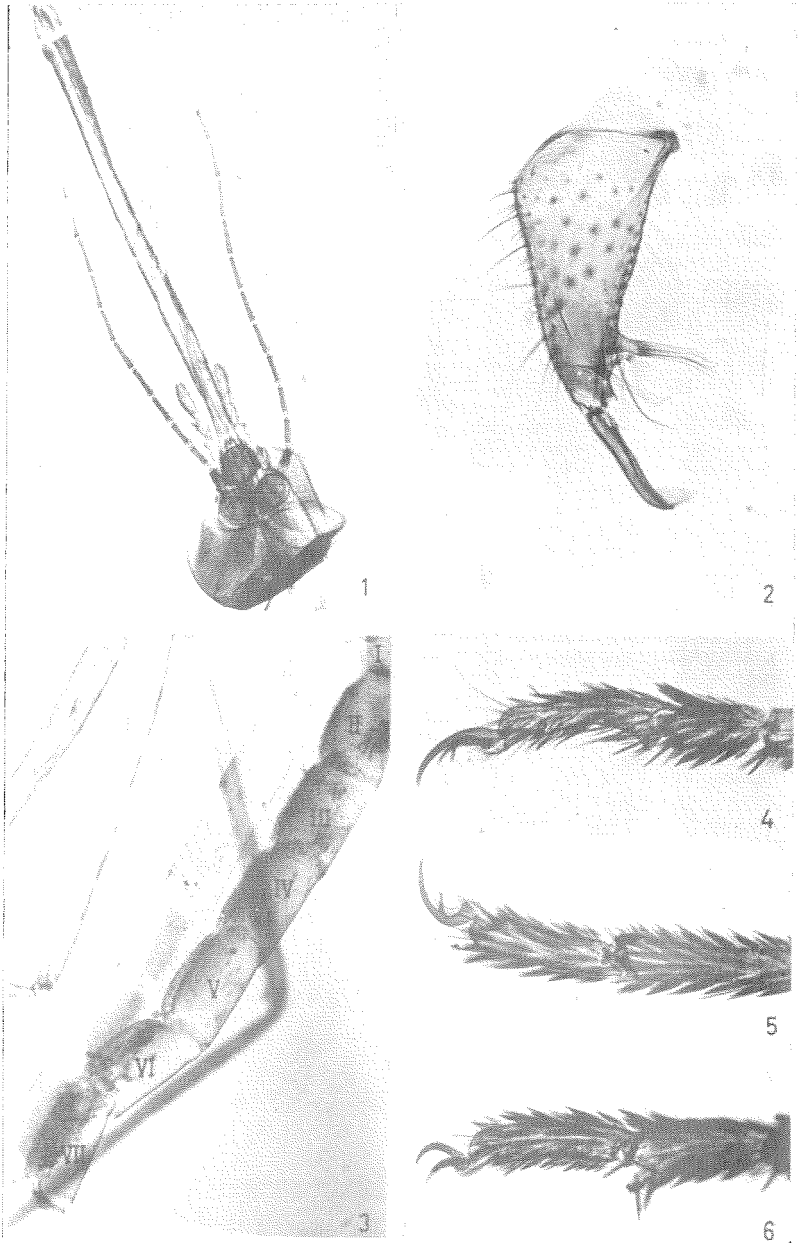

Gynandromorph of *Culex fuscocephalus Theobald*.
FIG. 1.—Head with normal female mouth parts.
FIG. 2.—Part of normal male hypopygium.
FIG. 3.—Abdomen showing female-type (1–5), male-type (7) and intermediate (6) segments.
FIG. 4.—Left fore-leg with hooked claw.
FIG. 5.—Left mid-leg with hooked claw.
FIG. 6.—Left fore-leg with simple claw.

to 5 were female in appearance, 6 was intermediate and the rest were male (Fig. 3). Although the wings were typically female, the legs showed bilateral characters; the left fore- and mid-legs were equipped with well developed male claws (Figs. 4 and 5) whereas the right fore-leg was female in appearance (Fig. 6). Unfortunately the right mid-leg was missing and therefore nothing could be said about its character. Dissection of the internal viscera was not made. The specimen has been cleared and mounted on a slide.

DISCUSSION. This bipolar gynandromorph of *Culex fuscocephalus* was generally female in appearance but possessed typical male genitalia. A very large number of such bipolar differentiated gynandromorphs have been described in the family Culicidae. During the past decade the number of described gynandromorphs has increased considerably and the majority of them are predominantly female in appearance. Laurence (1959) stated that "it is difficult to reconcile the predominantly female appearance of the majority of gynandromorphs with the small amount known about sex determination." Perhaps the answer to this question lies in the behaviour pattern of mosquitoes and/or in the method of collection employed. In most studies only female mosquitoes have been collected in numbers and examined, and this may account for the preponderance of female-appearing gynandromorphs. This assumes that female-type gynandromorphs exhibit conventional female behaviour.

Lum (1960) however, questioned a conventional behaviour pattern for gynandromorphs because of their absence in light trap collections. However, gynandromorphs have shown positive phototropism and large numbers of them have been collected in light traps (Rings, 1946; Pratt and Sudia, 1964; Rigby and Blakeslee, 1964; Rigby, 1966; Taylor, Meadows and Branch, 1966; Meadows, 1966; and Minson, 1969). Komp and Bates (1948) reported one gynandromorph of *C. coronator* from a donkey-baited trap and Taylor, Meadows and Branch (1966) and Meadows (1969) have described a large number of gynandromorphs (18 and 6 respectively) from bird-baited traps. The motive for entry remains questionable because some species of mosquitoes merely enter animal-baited traps in search of resting places, while others which commonly feed on the host refuse to enter traps (Aslamkhan and Salman, 1969). A gynandromorph of *Trichoprosopon digitatum* was collected off a human host but it was not known whether the mosquito attempted to feed (Lee, 1967). To date all attempts to feed a gynandromorph on blood in the laboratory have been unsuccessful but Taylor, Meadows and Branch (1966) reported a gynandromorph which had taken a partial blood meal from an exposed chick in a lard-can bait trap.

The specimen which we have described was collected after dusk off a cow along with several hundred unfed, partially fed and fully fed females. The gynandromorph, however, was unfed. Whether it was capable of taking a blood meal or not remains questionable, but in any case this gynandromorph was the first specimen reported from cattle-biting collections suggesting a female behaviour pattern. Male *C. fuscocephalus* have never been collected in cattle- or human-biting collections.

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