The eggs, left in tap-water for two weeks, remained unhatched. A slight pressure on the coverslip, however, easily liberated the miracidium through the opercular end. The protrusible apical crown contained sixteen pen-shaped spines in two distinct rows (Fig. 2). The prominent rows of cilia, in four distinct groups, had larger cilia in the anterior group occupying a comparatively greater area. Epidermal plates were not detected but the ciliated coat had below it a covering of squamous cells.

The miracidium (Fig. 3) measured 0·047–0·062 mm. in length and 0·020–0·028 mm. in maximum breadth. The larger spines measured 0·006–0·007 mm. in length and the smaller ones were 0·004–0·005 mm. long. The apical gland, granular and opaque in character, nearly reached the middle of the body in its extended form and distinctly showed, on each side, the five unicellular glands with their separate ducts. The brain mass and eye spot lay along the middle of its posterior region. A large unicellular penetration gland, with its prominent duct, was observed on either side of the apical gland in its anterior region. A pair of flame cells, lying at about two-third of the body length from the anterior end and with their sinuous ducts passing anteriorly and lying lateral to the five pairs of glands, was detected. Excretory pore was in level with the flame cells. Germ cells occurred in the posterior half of the body.

A study of the numerous stained and permanent mounts of the available adult specimens, on comparison with the accounts of the species so far described, emphasises the need for a re-examination and reassessment of the various forms so far described. In view of the confusion resulting from the extremely variable and intergrading characters that have been relied upon for specific differentiation, a correct identification of our material becomes difficult. Further, the sizes of the egg filaments do not seem to have correctly been recorded in the different forms. The present description of the egg and its miracidium might be useful in establishing the validity or otherwise of the known Indian forms in conjunction with or without the differential characters that have been utilised. Work in this direction is in progress.

Department of Parasitology, P. Rai.
U.P. College of Veterinary B. P. Pande.
Science & Animal Husbandry,
Mathura (U.P.), *August* 5, 1965.

1. Gupta, S. P., *Indian J. Helm.*, 1951, **3**(1), 41.
2. Srivastava, H. D., *Bull. Acad. Sc. Allahabad*, 1933, **3** (1), 41.
3. Yamaguti, S., *Systema Helminthum*, Vol. I. *The Digenetic Trematodes of Vertebrates*, Parts 1 and 2. Interscience Publication, New York, 1958.

MEROZOITES FROM GLOBIDIAL SCHIZONTS IN ABOMASUM OF INDIAN GOATS

The globidial cysts/nodules in abomasum of goats have been assigned to *Globidium gilruthi* (Chatton, 1910) by Sarwar (1951), Soliman (1958, 1960) and Ferguson and Goldsby (1961) who have given the sizes of these bodies and the sickle-shaped "spores" contained inside. Levine (1961) believed that these structures were schizonts and merozoites of *Eimeria gilruthi* (Chatton, 1910), Reichenow and Carini, 1937.

Of the hundred abomasa, available from local slaughter-houses during this month, nine were found to harbour giant eimerian schizonts—the so-called globidial cysts. These white rounded bodies, occurring mostly in the mucous membrane of the folds of the fundus of abomasum, could easily be located when the abomasum had been left for an hour in tap-water. Mature cysts, after extraction, measured 580–966 μ × 500–830 μ while the developing forms ranged from 200–780 μ × 180–670 μ in size. The distinctly double-layered cyst wall was upto 40 μ in thickness.

Stained smears from the fluid taken from twenty-two mature schizonts, after adequate fixation in 90% alcohol and methanol pure and subsequent staining in Ehrlich's hæmatoxylin and eosin, revealed numerous crescent-shaped merozoites which, under oil immersion objective of Olympus phase-contrast microscope, occurred in three sizes. The largest merozoites, 9·0–12·3 μ × 1·2–1·5 μ in size and more common than the two others, were straight or slightly curved and with tapering ends, the nuclear end being somewhat blunt. The oval or ellipsoidal nucleus lay about 1/3rd of the body length from the blunt posterior end (Fig. 1 *a*). Differences in size and shape were observed in the two other types. In the first type, the merozoites were 6·0–8·5 μ × 1·0–1·3 μ in size, thin, slender and slightly curved in form and with tapering ends. The nearly oval or spherical nucleus was situated a little away from the centre but mostly towards the anterior pointed end (Fig. 1 *b*). The second type, with a comparatively robust and stumpy form and abruptly ending extremities, measured 5·0–7·7 μ × 1·5–1·7 μ and the distinctly rounded

nucleus was somewhat centrally placed (Fig. 1 c). Numerous spherical residual masses were detected in these smear preparations.

FIG. 1. (*a*) Large-sized merozoites, (*b*) Small-sized merozoites, thin and slender form, (*c*) Small-sized merozoites, robust and stumpy form.

The size range in the larger-sized merozoites, in our material, accommodates the dimension given by Sarwar (10·0 μ × 1·5 μ). The size mentioned by Soliman (1960), however, agrees in length but differs in a greater width (10·0 μ × 1·8 μ) of the merozoites. The two smaller merozoites are within the size range indicated by Levine (4·5–7·5 μ × 1·2–2·0 μ) who has, however, not mentioned whether the dimensions relate to merozoites in smears or sections. It is likely that the robust form, in our material, in the smaller-sized merozoites might really represent an earlier stage in development of the thin and slender of the smaller merozoites. Further work is in progress to determine their correct status. Our smear preparations have yielded more than one type of merozoites in the abomasal schizonts belonging to *Eimeria*. Specific determination has finally to await a complete elucidation of the endogenous stages in all the eimerian parasites of goat currently known from their oocysts.

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Department of Parasitology, B. P. PANDE.
U.P. College of Vet. Science B. B. BHATIA.
and Animal Husbandry, Mathura,
June 30, 1965.

1. Levine, N. D., *Protozoan Parasites of Domestic Animals and of Man*, Burgess Publishing Company, Minnesota, 1961, p. 412.
2. Ferguson, D. L. and Goldsby, A. I., *J. Parasit.*, 1961, **47**, 726.
3. Sarwar, M. M., *Parasitol.*, 1951, **41**, 282.
4. Soliman, K. N., *Ibid.*, 1958, **48**, 291.
5. —, *J. Parasit.*, 1960, **46**, 29.

IN VITRO CULTURE OF EXCISED EMBRYONAL AXES OF *CLITORIA TERNAETA* LINN.

THE cultivation of isolated embryonal organs in sterile culture adds to our knowledge of morphogenesis in the embryo. This method of experimental study is also useful in assessing the relationships between embryonal organs. Isolated embryo segments like hypocotyl, epicotyl and cotyledonary node have already been grown successfully in culture (*see* Kusum Kanta and Padmanabhan, 1964).

In the present study excised embryonal axes of *Clitoria ternatea* were grown on nutrient agar. Nitsch's (1951) basal medium supplemented with vitamins was found to be ideal for normal growth of embryonal organs. Embryos were dissected out aseptically from green pods which were previously surface-sterilized by immersion in chlorine water for 15 minutes. After severing the cotyledons, the axis was planted in nutrient agar. The tubes were placed in a culture room maintained at 24° C. ± 1° C. and with 12 hours of illumination per day.

A majority of the cultured embryonal axes increased in size during the second day after inoculation. On the third day the root apical meristem was active and the tap root was evident on the following day. Elongation of the hypocotyl was noticed on the fourth day (Fig. 1). By this time the axis turned green.

Within a period of 15 days several secondary roots developed and ramified in the agar (Fig. 3). The terminal bud remained inactive upto 20 days.

In a second set of experiments the hypocotyl was isolated by a transverse cut below the cotyledonary node and planted on nutrient agar. In this case the course of development of the hypocotyl was similar to the one described for entire axes. Elongation was not affected by removal of apical bud (Fig. 3).

Normal plants were obtained from all the cultures of entire axes.

A curious feature observed during the growth of the hypocotyl was the curvature of its upper