RECORD OF THE EGG PARASITE, *TRICHOGRAMMA CHILONIS* ON *PAPILIO* SPP IN CITRUS

A. KRISHNAMOORTHY and S. P. SINGH
Division of Entomology and Nematology,
Indian Institute of Horticultural Research,
Bangalore 560 089, India.

THE larvae of citrus butterflies, *Papilio demoleus* L and *P. polytes* L (Lep., Papilionidae) cause extensive damage to new flush in citrus nursery and field. The larvae and pupae are attaked by many indigenous natural enemies[1-3]. A report of *Trichogramma evanescens* Westw, (Hym., Trichogrammatidae), *Telenomus* sp. (Hym., Scelionidae) and *Pteromalus luzonensis* L (Hym., Pteromalidae) is the only record of egg parasitism of *Papilio* spp.[4] During the search for natural enemies of *Papilio* spp in 1984 at the Indian Institute of Horticultural Research Farm, Hesseraghatta, Bangalore, two species of parasites were collected from the eggs of *Papilio* spp. They were identified as *T. chilonis* Ishii and *Telenomus* sp. *T. chilonis* is recorded for the first time on eggs of *P. demoleus* and *P. polytes* in India and was found to produce as high as 75.86% parasitism in nature.

T. chilonis readily parasitized 1–2 day old eggs of *Papilio* spp in the laboratory and development was completed in 8.3 days at 28 ± 1°C. Adults survived for 6.9 days when fed with 40% honey solution. Each parasitized egg of *Papilio* spp yielded 8 to 27 adults of both sexes. The sex ratio (♂ : ♀) was found to be 1:7.06

Perhaps *T. chilonis* could be mass bred on eggs of rice moth *Corcyra cephalonica* (Staint) (Lep., Galleriidae) and released for the suppression of *P. demoleus* and *P. polytes*.

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CHARACIOCHLORIS APICULATA KORSHIKOV (TETRASPORALES, CHLOROPHYTA)—A NEW RECORD FOR INDIA.

LEELA T. DEORE* and M. S. BALAKRISHNAN
Department of Botany, University of Poona,
Pune 411 017, India.
** Department of Botany, JaiHind College of Arts, Science and Commerce, Dhule 424 002, India.*

CHARACIOCHLORIS APICULATA, a rather rare alga, came up in one of the soil cultures started with a sample collected in May 1975, in the vicinity of the Kirkee pond, situated near the Poona University Campus. Initial cultures of the sample were made by adding 50 ml of sterilized distilled water to 10 g of soil to make a rough biphasic culture for enrichment. As the algae started coming up in the cultures, they were inoculated as a mixed flora on solid BBM-agar petri plates.

Distinct colonies of algae could be seen on the agar plates 10 days after inoculation. At this stage *Characiochloris* was isolated and transferred into liquid BBM medium and later, by repeated subculturing, brought into culture. Detailed studies on the morphology and reproduction were made in unialgal as well as pure cultures.

Characiochloris occurs in the solitary as well as in the gregarious state, in the latter case forming dense clumps (figure 1). The young cells are ellipsoidal-fusiform in shape. The apical end is rounded. There is no basal stalk but a disc-like thickening is present at the base with a brownish halo round the point of attachment. The parietal chloroplast has a single pyrenoid and two to several contractile vacuoles are scattered peripherally (figures 2, 3). With age, the protoplast retracts slightly and then undergoes a series of divisions (figures 3–7, 9). Synchronously the wall gets gelatinized and stretched to accommodate the newly formed and enlarging protoplasts. Mature thalli, thus, appear ellipsoid sacs containing 2–32 or even more protoplasts. Each protoplast is uninucleate and contains a laminate-costate unipyrenoidal chloroplast and 4 to 5 contractile vacuoles, but lacks an eyespot. The sacs measured from 12–69 μm in length and 6–39 μm in breadth.

By successive divisions, the protoplasts of the alga give rise to 4, 8, 16, 32 or more zoospores. The zoospores are biflagellate, the two flagella equal and about body length. The chloroplast is parietal with a submedian pyrenoid; there are 2–3 contractile vacuoles

and a conspicuous eyespot. The zoospores measured from 10.5-12 μm in length and 7.5 μm in breadth (figure 12).

The zoospores swarm for a while and finally escape through the pores formed by gelatinisation of the outer envelope either at the apex alone (figures 8, 10) or at the apex as well as at the base (figure 11).

After liberation, the zoospores swarm actively and finally settle down by the anterior end. By further growth and division, new individuals are developed in a manner similar to those illustrated in figures 2–7 and 9. The present observations in this respect are similar to those of previous workers[1, 2].

In dimensions and other features, the present alga

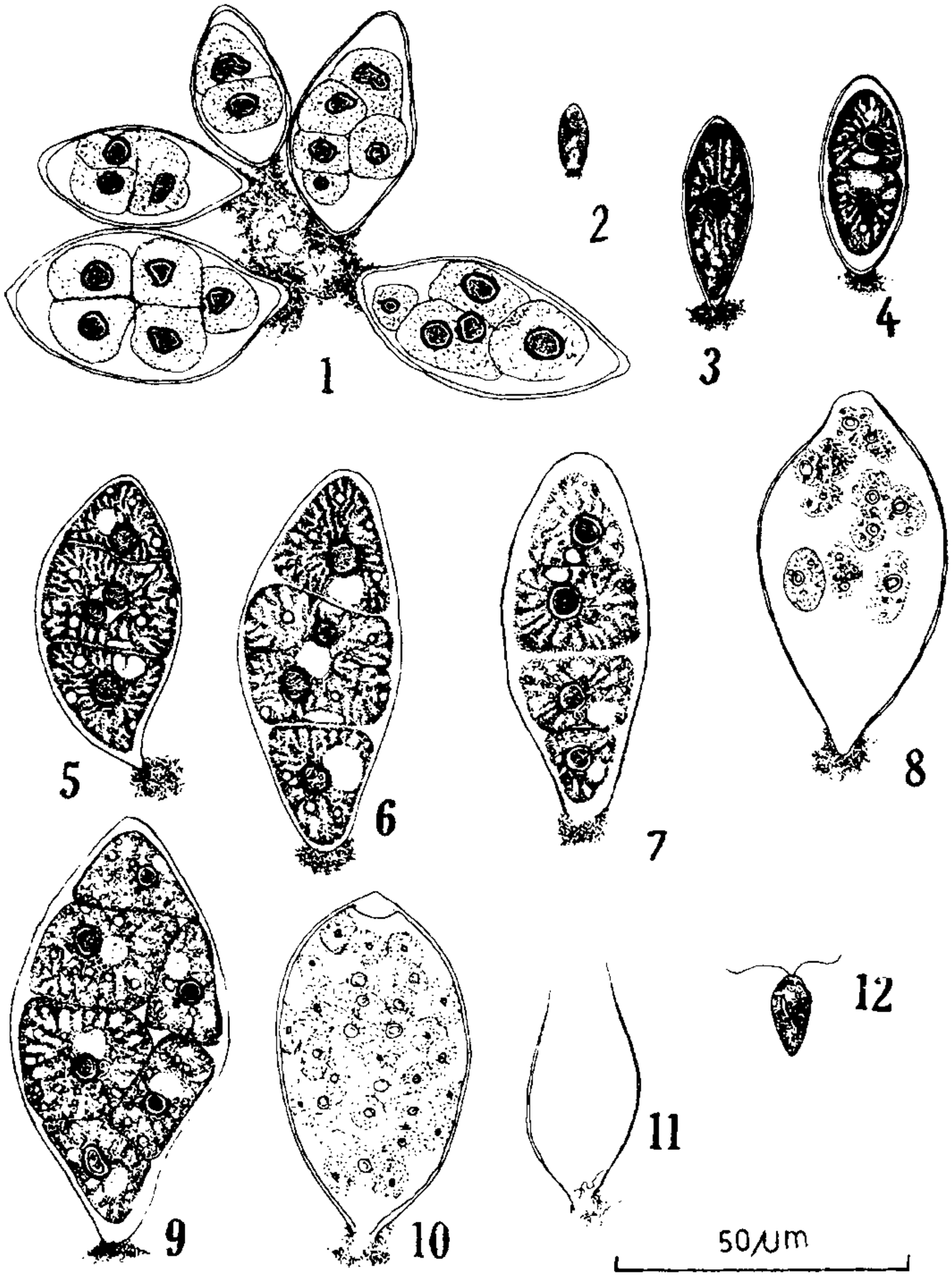

Figure 1–12. *Characiochloris apiculata* Korshikov. **1.** Habit. **2.** Germinating zoospore. **3.** Young cell showing the cell structure. **4–7, 9.** Dividing protoplasts of the alga. **8, 10.** Formation of zoospores in the cell. **11.** An empty cell after liberation of zoospores. Note the gelatinization of wall at the base and apex of cell. **12.** Biflagellate zoospore.

comes close to *C. apiculata* Korshikov and is, therefore, considered conspecific with it.

The genus *Characiochloris* was erected by Pascher[3] on *Chlamydomonas characioides* Korshikov from USSR. Subsequently, the alga has been reported from various countries[2-6].

Though Pascher[3] had included *Characiochloris* under the Volvocales, Fritsch[1] included the genus in the family Chlorococcaceae (Chlorococcales), considering it a *Characium*-like alga with contractile vacuoles. Philipose[7] put this alga by the side of *Characium*, following Fritsch[1] in this respect.

Fott[8] and Bourrelly[9] included this genus in the family Chlorangiaceae (now Chlorangiellaceae) under Tetrasporales. Fott[6] lists seven species under this genus; *C. characioides* (Korsh) Pascher, *C. sessilis* (Korsh) Pascher, *C. obtusa* Korsh, *C. crassa* Korsh, *C. apiculata* Korsh, *C. ettlii* Fott and *C. clathrata* Skuja. Bourrelly[10], however, lists 18 species including some more of Skuja's species and making some new combinations of taxa previously considered species of *Chlorangiopsis* and *Chlorangium*.

Iyengar's[2] *Characiochloris anophelesii*, differs from the other species in the possession of a definite gelatinous stalk of considerable length, reminiscent of *Chlorangiochloris* rather than *Characiochloris* as defined by Pascher and Bourrelly. There are also one or two other minor points of difference. A decision, however, will depend on collection of this species once again and critical comparison with Iyengar's collection, and also with the type species, *C. characioides* (Korsh) Pascher.

Finally, we would like to add that the late Prof. Iyengar had for long suspected rather close relationship between *Characiochloris* and *Characiosiphon*. In the discussion of *Characiosiphon* along with its original description Iyengar[11] repeatedly drew attention to the resemblance between the young stages of *Characiosiphon* and *Characiochloris* and concluded (l.c.p. 315) that "It is very probable that the alga has been derived from some unicellular ancestor resembling *Characiochloris*".

Further, in notes made a little prior to his passing away Iyengar compared between the chloroplasts of *Characiosiphon* and *Characiochloris*, (in particular, *C. characioides*) and concluded that the similarity of the chloroplast is very striking and there is, on this account "a greater basis for considering *Characiosiphon* as closely related to *Characiochloris*".

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SEM STUDIES OF POLLEN GRAINS OF SOME DIPLOID AND POLYPLOID SPECIES OF *GLORIOSA* L

B. A. HEGDE and M. R. LUGADE
Department of Botany, Shivaji University, Kolhapur 416 004, India.

THE liliaceous genus *Gloriosa* L ($2n = 22$) has attracted interest because of its beautiful showy flowers and its important alkaloid colchicine in the seeds and rhizomes. Cytological and hybridization studies[1] and cytopalynological studies[2-4] have tried to clarify demarkation between the species. However, light microscopic characterization of pollens severely restrict detailed studies. Application of scanning electron microscopy (SEM) in identifying exine stratification helps unravelling many details and correct identification. In this note, SEM studies of four *Gloriosa* species viz *G. plantii* Loud a diploid, *G. Masterpiece* a tetraploid and *G. Shrimati-Bhima* and *G. rothschildiana* O'Brien both octaploid are reported.

Mature anthers of deep yellow colour were collected prior to anthesis. Acetolyzed pollen grains were viewed with a scanning electron microscope (Cambridge Stereoscan 150) (by courtesy of National Chemical Laboratory, Poona). The pollen grains exhibited the following exine ornomentation pattern.