Parmelia pseudocrinita des Abbayes, Bull. Inst. Fr. Afr. Noire. 20:19. 1959; Hale, Contr. U. S. Nat. Herb. 36(5): 303.1965 (figure 2).

Thallus saxicolous, dull mineral grey, coriaceous; lobes rotund 5- 10 mm wide, ciliate; cilia coarse up to 2.5 mm high; upper surface smooth and becoming rugulose at maturity, laminally isidiate; isidia cylindrical; medulla white; lower surface black with a brown naked zone at the margins; rhizinae simple; apothecia lacking. Medulla K−−; C+ rose; KC+ red; P—; atranorin and gyrophoric acid present.

Parmelia pseudocrinita is widely distributed in South and East Africa. Outside South Africa, it is known also from Thailand[6] (Kurokawa, Lich.Rar.Crit.Exs.no.33(0). The occurrence of this South African taxon in Indian region is of great phytogeographical importance. In India, it appears to be rare and collected from two localities in Nagaland, at altitudes of *ca* 1300 m and *ca* 2150 m respectively. *P. pseudocrinita* is closely allied to *P. crinita* Ach which contains soft thin thallus, stictic and constictic acid in medulla. In external morphology, *P. pseudocrinitu* also resembles *P. subtinctoria* Zahlbr which has brown lower surface and salacinic acid in medulla.

Specimens examined: Nagaland, Pfutsero, at about 2 km on Imphal road, Sinha, N. 862 and N. 863.

Parmelia subcoronata Müll. Arg. Rev. Mycol., 9:135. 1887a (figures 3–5).

Thallus corticolous, mineral whitish grey; lobes sublinear to irregular, coriacious, 2–3 mm wide, margins bulbate ciliate; upper surface heavily pycnidiate; soredia and isidia absent; lower surface rhizinate, rhizinae simple; apothecia numerous, crowded and coronate; spore simple 14–18 × 9–14 μm. Medulla K + yellow turning red; C—; KC—; P+ yellow-red; atranorin and norstictic acid(?) present.

The species so far known only from South America is characterized by the absence of isidia, soredia, presence of bulbate cilia, coronate apothecia and norstictic acid in medulla. The other bulbate, coronate species reported[7] from India is *P. bulbochaeta* Hale, which is distinguished from *P. subcoronata* by giving- K—; C—; KC—; P—; reactions in medulla.

Specimens examined: Nagaland, Tuensang-forest department compound, Sinha, N. 963.

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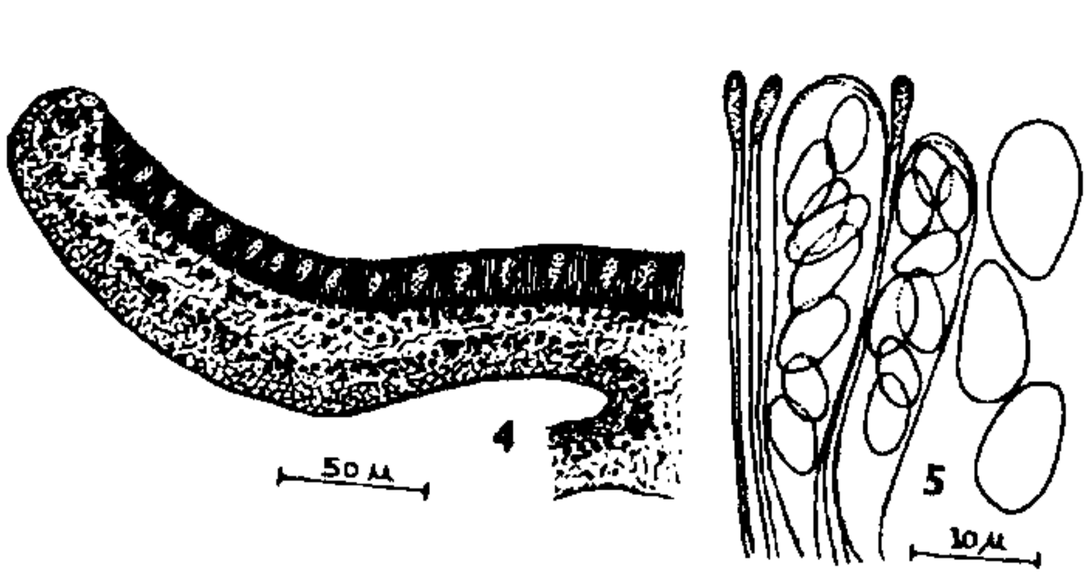

Figures 4–5. *P. subcoronata*. **4.** V. S. through a portion of apothecium; **5**. Asci and spores.

CHARA VULGARIS VAR INCONNEXA F *HIPPELLIANA*: A NEW RECORD FOR INDIA AND ITS KARYOTYPE

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IN continuation of our taxonomic survey of West Bengal Charophytes[1–5], we recently collected a very interesting species of *Chara* from the bank of river Damodar in the Hooghly district of West Bengal, in the month of December 1984. A close scrutiny revealed that the species is *Chara vulgaris* L var *inconnexa* (T. F. A.) R. D. W. f *hippelliana* (Vihl.) R. D. W. following the Monograph and Iconograph "Revision of Characeae"[6]. This taxon belongs to the section and subsection *Chara*. It was previously reported from a single locality in Czechoslovakia and has since not been reported from any other part of the world. Thus the present record of this taxon in a country far away from its place of original habitat is rather surprising

and contributes first report of this taxon in India [7–11]. A brief description of the Indian material follows:

Plants monoecious, 10–12 cm high, incrusted. Axes 577.5–610.5 μm in diameter; internodes 0.5–1.5 cm long; cortex 2-corticate, tylacanthous; spine cells solitary, to 66 μm long, globular. Stipulodes diplostephanous, 2 sets per branchlet, small ovoid, 66–99.5 μm long. Branchlets 8 per whorl, 0.8–1.5 cm long; segments 5–6, lowest 2–3 corticated, rest ecorticated. Bract cells 3–4, anterior long, posterior small. Bracteoles 2, similar to anterior long bracts, slightly shorter or equal to mature oogonium. Gametangia conjoined at 2–3 lowest branchlet nodes adjacent to corticated segments. Oogonia solitary, 693–726 μm long, 396–412.5 μm wide; coronula 132–148.6 μm high. Oospores black, 528–561 μm long, 297–313.5 μm wide; striae of 9–10 prominent ridges terminating in a basal cage. Antheridia 396–412.5 μm in diameter.

The chromosome number of this taxon was determined following techniques worked out earlier[12]. The chromosome morphology and detail karyotype (figure 1a) of this taxon was worked out from squash preparation of antheridial filament cells (figure 1). The chromosome number was $n = 28$, which is also reported for the first time[13–16]. Length of chromosomes varied from 1.84 to 4.14 μm. Chromosome morphology was designated after Levan *et al*[17]. TF % was calculated following Huziwara[18] and was 37.71. Chromosomes were also categorized according to their length. From the data collected, the karyotype formula was determined as $L(O) + M(Sm_7 + m_2 + St_0) + S(Sm_{13} + m_5 + St_1)$ Where L, M and S stands for long, medium and short-sized chromosomes respectively while Sm denote submedian; m, median and St, subterminal chromosomes.

In this species, one chromosome was found to have secondary constriction which was revealed only after proper pretreatment. The haploid chromosome complement of 28 chromosomes showed 20 submedian (7 medium-sized and 13 short-sized), seven median chromosomes (2 medium and 5 short-sized) and one subterminal chromosome of short-sized group. The detailed karyotype picture and the typical nature of the secondary constricted chromosome observed in this taxon suggest that this has been rightly placed by Wood under *Chara vulgaris* complex.

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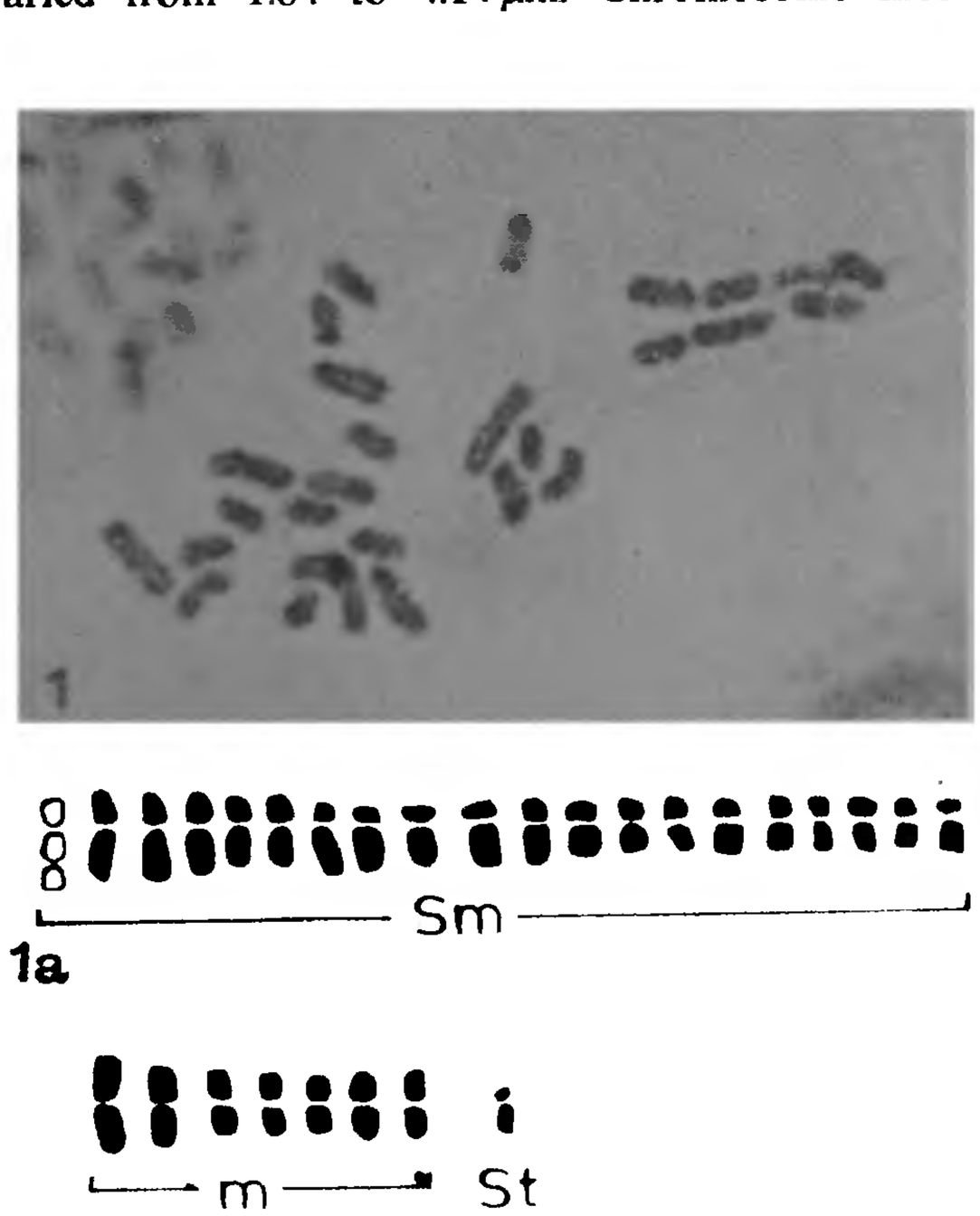

Figure 1. A squash preparation of pretreated antheridial filament cell showing $n = 28$ chromosomes (× 1450). **a**. Idiogram of the same.

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REGENERATION OF RICE PLANTS FROM LONG-TERM ROOT AND EMBRYO-DERIVED CALLUS CULTURES

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REGENERATION of plantlets from callus cultures is often lost after 2–3 subcultures in rice[1]. But plantlet regeneration in long-term cultures is of great significance for genetic manipulation especially in rice improvement. Regeneration of plantlets from calli of different explants was achieved for a few varieties in Indica and Japonica subspecies[1–2]. But callus tissues of many varieties do not exhibit shoot formation[3]. Heyser *et al*[4] reported the retention of totipotency in rice for 350 days. The present studies, however, mainly deal with osmoregulation and regeneration of rice plants beyond 600 days with high frequency of response.

Seeds of rice were dehusked and surface-sterilized with 0.1% mercuric chloride for 5–6 min and washed thoroughly with sterile distilled water. These sterilized seeds of rice were germinated in petri dishes in diffuse light (400 lux). Primary roots (1 cm long) were isolated aseptically from 7-day-old seedlings. Two to three root explants were inoculated into each tube containing 15 ml of medium. Callus from these root explants and mature embryos of Indica rice (*Oryza sativa* L) variety Bala was initiated on Linsmaier and Skoog's[5] (LS) medium supplemented with 2 mg/l of 2,4-dichlorophenoxyacetic acid (2,4-D), 2% sucrose and/or 3% sorbitol and/or 3% mannitol. The growth of callus initiated from roots and embryos on LS medium with sucrose as sole source of carbon was less, compared to tissues grown on sucrose plus sorbitol and/or mannitol as measured by fresh and dry weights (table 1). Tissues grown on medium containing only sucrose were slightly brown to tan and wholesome. The tissues were light yellow and loosely arranged on medium containing sucrose plus sorbitol (figure 1) or sucrose plus mannitol. Mild osmotic stress on the cultures of tobacco[6] and soybean[7] increased callus growth and modified the cellular morphology. Maretzki *et al*[8] reported that mannitol was least effective in reducing sugarcane cell weight.

Callus tissues derived from roots and mature embryos of Bala failed to grow on LS medium supplemented with sorbitol and mannitol separately as sole carbon sources (without sucrose). Root and embryo calli (45-day-old) grown on sucrose containing

Table 1 *Callus growth and plant regeneration of rice cultivar Bala*

Callus source	Medium Supplements	Fresh weight* g/culture	Dry wieght* g/culture	Regenerating ability** Callus age (days)	% Regeneration	Number of regenerated plants
Root	2% sucrose	0.42	0.5	45	20–23	25
Root	2% sucrose	–	–	75	–	–
Root	2% sucrose + 3% sorbitol	0.70	0.10	600	50–61	75
Root	2% sucrose + 3% mannitol	0.69	0.10	600	51–60	120
Embryo	2% sucrose	0.44	0.05	75	15–16	32
Embryo	2% sucrose	–	–	100	–	–
Embryo	2% sucrose + 3% sorbitol	1.21	0.15	600	49–60	146
Embryo	2% sucrose + 3% mannitol	0.93	0.12	600	52–61	130

* 30-day-old callus from 6 replicate cultures
** Average of 30–50 replicates/treatment (regeneration medium LS + mg/l IAA + 4 mg/l KN + 2% sucrose).