separate glass-jars containing soil-water medium. The jars were kept near a window, receiving natural light and dark conditions. The water of jars was changed twice and the level maintained with fresh tap-water. The plants grew well attaining a height of 8.3 cm during nearly three months. The chief diagnostic features of the material both from nature and in culture were recorded and the identification was effected using standard monographs. Since the morphological features agreed well with earlier descriptions[1,2] the plant was designated as *Chara corallina* Wildenow.

Plants monoecious, flexible and 8–30 cm high; stem moderately stout; stem and branchlets completely ecorticate; internodes just double to branchlets towards upper portion, sometimes thrice to branchlets towards lower region; stipulodes in a single circle (hapolstephanous), alternating with the branchlets; branchlets 5–7, in a whorl; segments 2–4; bract cells 1–3 and small, sometimes lacking at the ultimate branchlet-node; gametangia conjoined; antheridia 360–630 μm in diam.; oogonia 645–1140 μm long and 505–780 μm wide; oospores black, 990–1245 × 825–1005 μm in dimension.

For cytological studies, the growing whorls containing antheridia from culture materials were fixed in 1:3 acetic ethanol mixture. Squash preparations were made of antheridia plucked from the single individual, following Godward's[3] acetocarmine technique.

The interphase nucleus is sub-spherical, 6–7 μm in diam., with single nucleolus measuring 1.5–1.8 μm in size. It is also characterized by the presence of chromocentres of variable number. The nuclear division conformed to the standard pattern of mitosis met with in typical eukaryotes. However, the high preponderance of chromosomal variability exhibited by the plant under culture conditions was of paramount interest from cytological and cytogenetical standpoint. Chromosome numbers of $n = 14$, 21, 28, 36 and 42 were recorded from different cells of antheridia borne on the same individual plant. Variability in chromosome number was obvious even with the adjacent cells of the antheridial filaments emanating from the same antheridium. Amongst the different numbers encountered $n = 36$ chromosomes was the commonest, representing the new chromosome count together with $n = 21$ and 28 chromosomes also ascertained for the first time for the taxon. The high degree of numerical changes can be attributed to frequent non-disjunction of chromosomes/irregular mitosis due to high grade vulnerability of sporogenous cells. The preponderance of such a variation during spermatogenesis appears to bear great evolutionary potential. The present findings lead us to the conclusion that natural polyploidization coupled with aneuploidy is responsible for the existence of different cytotypes[4] in the *Chara corallina* Complex as established earlier in several other forms belonging to different groups of algae[4,5].

Besides further karyological investigations, studies on oospore germination and the segregation of markers in the subsequent generations can throw greater insight in our understanding of speciation and evolution.

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STUDIES ON GERMINATION BEHAVIOUR IN RICE TREATED WITH GAMMA RAYS

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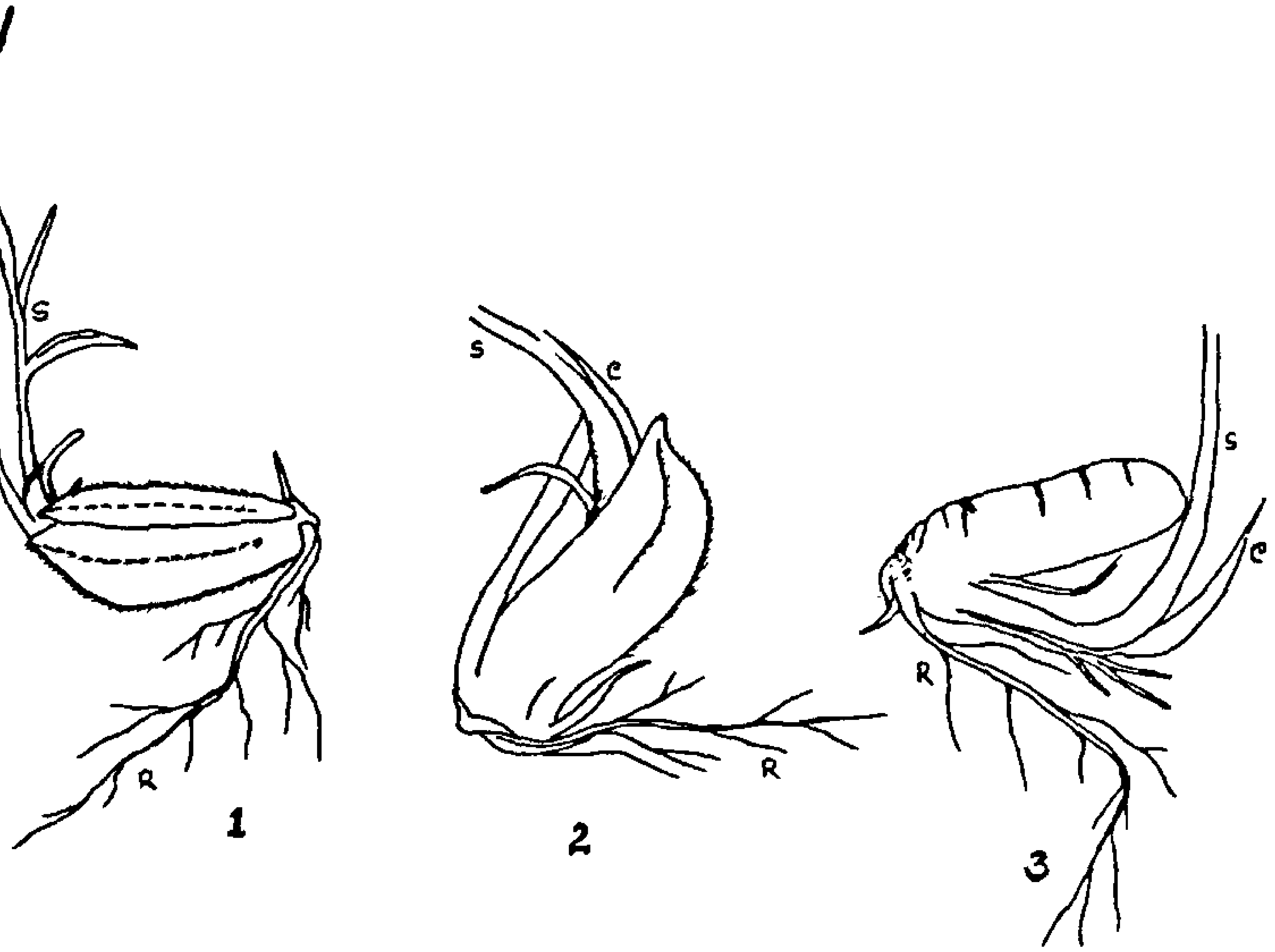
RICE seeds germinate normally through the micropyle, first by the emergence of a primary root followed by plumular emergence and seminal root growth. However, one of our studies on mutagenesis with rice seeds of IR 36 irradiated with 20 Kr of γ-rays showed a lower rate of germination/survival of 38% in M_1. Of these 2.6% of seeds showed an abnormal germination behaviour; the plumule penetrating through the lemmar space horizontally and emerging through the anterior end of the grain



Figures 1–3. **1.** Cleistopary showing antimicropylar emergence of shoot; **2.** Vertical view; and **3.** Husks removed. [C, Coleoptile; S, Shoot; R, Radicle.]

(figure 1), thereby exhibiting a phenomenon termed cleistopary, i.e. germinating/emerging through the anterior end of lemma-palea as a result of infra-lemmar horizontal plumular and/or root growth. Along with the emergence of the shoot, a few roots also traversed and emerged through the anterior end of the grain (figures 1–3). However, a tiny radicle was seen to have grown out normally at the posterior end through coleorhiza. Kernel appeared slightly reduced in size and laterally compressed, probably, due to the pressure exerted by the horizontally emerging shoot.

Enlargement of the coleorhiza and the coleoptile, followed by elongation of the primary root and the embryonic shoot are the first outward manifestation of grass seed germination[1]. It may be surmised that either a shift in plumular growth or any radiation injury to the apical shoot and subsequent development of the axillary shoot might have caused the infra-lemmar horizontal penetration of the growing plumule or shoot through the available space within lemma-palea so as to allow emergence through the anti-micropylar or anterior region of the grain (figures 1–3). This situation also might have caused certain difficulty in germination at least in certain cases and the low level of germination/survival in IR 36 treated with 20 Kr γ-ray might probably be attributed to the induced cleistopary as one of the causes in addition to other possible hormonal changes[2]. Further studies including possible hormonal influences with the same irradiated material are being followed up with later generations.

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