

scopic examination of this pebbly rock has also revealed the occurrence of abundant *Lithothamnion* of which at least three different kinds seem to be recognisable—all the 'pebbles' being seen as nothing but patches of algæ.

We consider the occurrence of these algæ in the Cullygoody limestone as of great importance since they belong to a period even earlier than that represented by the Niniyur flints and limestones. Whereas the latter represent the topmost sub-division of the Trichinopoly Cretaceous, corresponding to the Danian of the European stratigraphical scale, the Cullygoody limestone is a member of the lowermost sub-division—the Utatur stage—which is equivalent to the European Cenomanian.

From the evidence now available it is thus obvious that not only were the algæ abundantly present during the Cretaceous period in India, but also that they have been one of the most important limestone builders in the upper Cretaceous seas of Southern India.

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<sup>1</sup> NATURE, Aug. 8, 1931, p. 225, and Nov. 21, 1931, p. 873.

<sup>2</sup> NATURE, Mar. 19, 1932, p. 441.

#### Diploidisation of Haploid by Diploid Mycelium of *Puccinia helianthi* Schw.

THE interaction of two haploid cells of opposite sex to produce the diplophase is a phenomenon well known in heterothallic species of the Hymenomycetes and of the smut and rust fungi. Buller<sup>1</sup> has recently shown that a diploid mycelium of *Coprinus lagopus*, on coming into contact with a haploid mycelium of that species, transforms the latter mycelium into the diploid condition. He has introduced the word *diploidisation* "to designate in the Hymenomycetes the process by which a haploid cell, or mycelium, is converted into a diploid cell, or mycelium, by the formation of conjugate nuclei within the cell or mycelium". An extension of the application of this term to designate a similar process in other groups of the Basidiomycetes, such as the smuts and rusts, does not appear inappropriate.

Craigie<sup>2</sup> found that *Puccinia helianthi* Schw. is heterothallic. His experiments showed that the diploid, or æcial, stage could be produced by allowing two haploid pustules of opposite sex to coalesce, or by applying the pycnospore-containing nectar of a haploid pustule of one sex to a similar pustule of opposite sex. Experiments which I have recently carried out show that diploidisation of a haploid mycelium of this rust also occurs when it comes into contact with a diploid mycelium. This phenomenon may very probably be found to occur in other heterothallic eu-autoecious rusts.

Sporidia of *P. helianthi* were sown sparsely on the upper surface of the first two foliage leaves of sunflower seedlings (*Helianthus annuus* L.). From these inoculations there arose forty-nine haploid pustules.

When three weeks old, none of these pustules bore æcia. Twelve of them were then marked, to serve as controls; and beside sixteen others, at a point just beyond the periphery of each, urediniospores of *P. helianthi* were sown. A week later urediniospores were sown similarly beside twelve other pustules; and, a week later still, a sowing of

urediniospores was made beside the remaining pustules.

As a result of these inoculations, uredinia (diploid pustules) arose at, or very near to, the margin of each of the thirty-seven haploid pustules. Thus diploid mycelium grew in juxtaposition to haploid mycelium.

From eight to twelve days after the inoculations with urediniospores were made, æcia began to appear on the under side of all the thirty-seven pustules. Usually the æcia first appeared in that part of a pustule lying nearest to the uredinial pustules, and later in the parts more remote (Fig. 1). In a few pustules, the first æcia to appear arose rather irregularly spaced over the whole under-surface of each. No æcia appeared in any of the control pustules.

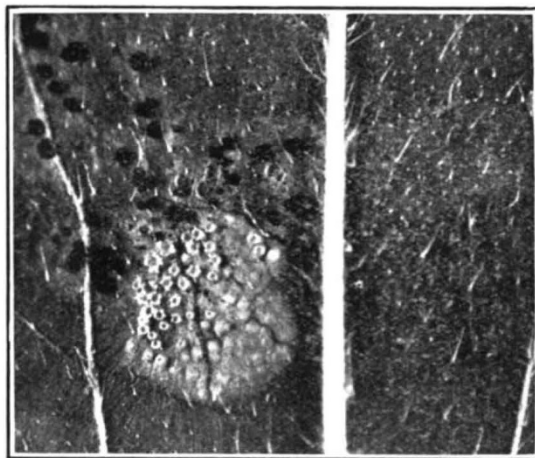


FIG. 1.—The under surface of a part of a sunflower leaf showing a monosporidial (haploid) pustule of *Puccinia helianthi* in which has occurred diploidisation by uredinial (diploid) pustules of that rust. Æcia have appeared at the side of the monosporidial pustule adjoining the uredinial pustules. The photograph was taken fourteen days after the leaf was inoculated with urediniospores, at which time the monosporidial pustule was thirty days old.  $\times 4.5$ .

A cytological examination of the pustules which produced æcia has not been made, but it is assumed on the basis of these experiments that, when contact between a haploid and a diploid mycelium of *P. helianthi* is established, the diploidisation of the haploid mycelium is effected by successive nuclear divisions and migrations, as has been described by Buller<sup>1</sup> for *C. lagopus*.

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<sup>1</sup> Buller, A. H. R., NATURE, 126, 686, Nov. 1, 1930; "Researches on Fungi", vol. 4, p. 187; 1931.

<sup>2</sup> Craigie, J. H., NATURE, 120, 116 and 765, July 23 and Nov. 26, 1927.

#### Helium Content of Beryllium

THE abnormally high helium content of several Palæozoic beryls discovered by Strutt<sup>1</sup> has recently been verified by Paneth and Guenther.<sup>2</sup> Atkinson and Houtermans have discussed<sup>3</sup> the proton bombardment in the interior of the stars and the possible formation of Be<sup>8</sup> which being probably unstable would yield two helium nuclei, and Lord Rayleigh<sup>4</sup> suggests that the