

THE SIMILARITY EXISTING BETWEEN SOME ALGAE AND SOME POLLENS WITH A FURTHER NOTE CONCERNING PHYTOMORULA REGULARIS KOFOID¹

CLARENCE E. TAFT,
The Ohio State University

Herbert F. Copeland (1937) pointed out the similarities existing between certain Mimosoideae pollen and Kofoids algal genus *Phytomorula*. This paper, in Madroño, appears not to have had the wide circulation among algologists which it deserved.

To anyone who has seen pollen from such species of *Acacia* as *A. longifolia*, *A. baileyana*, or *A. verticillata*, there can be no doubt as to the accuracy of Copeland's conclusions. A discrepancy which he mentions, however, does exist between the two published figures of *Phytomorula*. That by Kofoid (1914) shows a small dome-like protuberance on each cell, while Smith's figure (1933) shows a larger, broad protuberance. Copeland was not able to explain this discrepancy, although he suspected that the shape of the protuberance was dependent upon the degree of exposure to which the pollen cluster had been subjected. The present work appears to verify these suspicions.

The writer, in organizing a reference collection of pollen in connection with a study of fossil and subfossil algae of Ohio Bogs, noted the similarities as well as the discrepancies existing between *Acacia* pollens and the figures of *Phytomorula*. In an attempt to find a suitable method of preparing pollens for study, the reasons for these differences became evident. A pollen cluster of *Acacia* when taken directly from the flower and shown in Fig. 1c, shows the broad protuberance on the outer face of each cell. When such a cluster is treated with various mounting media, a distinct shrinkage is evident, resulting in small dome-like protuberances as figured by Kofoid, Fig. 1a. If the shrinkage is controlled by varying the concentration of the media, clusters will be found in which some of the cells show the small dome-like protuberance, while others exhibit no sign of shrinkage, Fig. 1b. Figure 1d is a copy of Smith's figure of *Phytomorula*.

Such differences in the contour of cells of *Acacia* pollen clusters therefore appear to be due to varying periods of exposure before collection. The discovery of the true nature of *Phytomorula* by Copeland is an excellent example of the implications which may be evident to the algologist and non-algologist alike.

With the recent advance in the study of fossil pollen and fossil algae in peat deposits, the need for a reciprocal knowledge of their respective fields by the pollen analyst and algologist is evident. As both pollen and algae occur interspersed in the same deposits, it is sometimes very difficult to identify them with any degree of certainty unless they or their near relatives have been previously encountered in living condition.

The foregoing example is merely a case where the algologist was led into committing an error because of a lack of information concerning pollen structure. If we look at the other side of the fence, we find possibilities of pollen workers committing the same kind of errors. If there is so great a resemblance in one direction, then there may be a possibility of the situation being reversed. In substantiation of this, there is a genus of the unicellular algae, *Trochiscia*, the species of which are identified entirely on wall characters. Species having reticulate,

¹Paper from the Department of Botany, The Ohio State University. No. 481.

spiny, or otherwise sculptured walls might easily be mistaken for pollens. Also that certain pollens might be assigned to this genus by the inexperienced algologist. Another error, and one which I feel may have been committed in some instances, is the identification of the cysts of certain species of *Trachelomonas* as grass pollens. This genus, a relative of *Euglena*, is characterized by having the individual surrounded by a silicious cyst with one pore. A study of the cyst, however, will readily distinguish it from pollens.

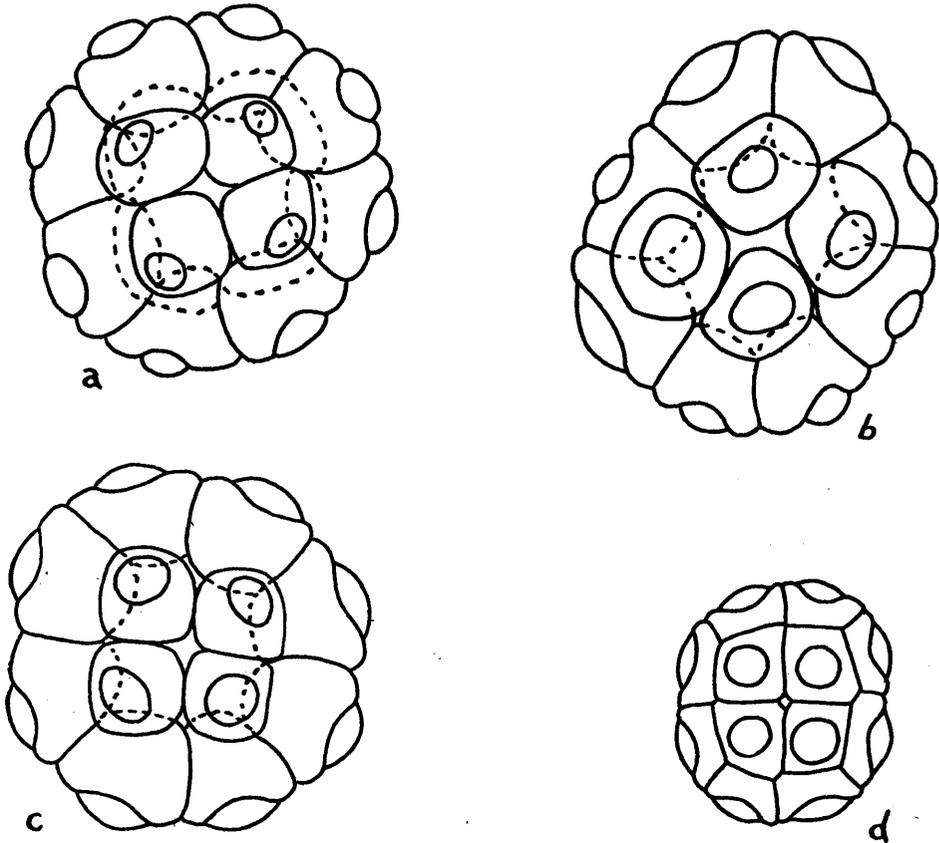


FIG. 1. a—Kofoid's figure of *Phytomorula regularis*; b—Pollen cluster of *Acacia longifolia* with some cells showing marginal shrinkage; c—Fresh pollen cluster of *A. longifolia* with no marginal shrinkage; d—Smith's figure of *Phytomorula regularis* Kofoid.

In order to eliminate the possibility of error, the algologist, and especially the one interested in fossil algae, should familiarize himself with as many pollens as possible. Likewise, the pollen analyst should be familiar at least with the various classes of algae.

LITERATURE CITED

- Copeland, Herbert F. 1937. On the pollen of the Mimosoideae and the identity of the supposed alga *Phytomorula*. *Madroño*. 4(4): 120-125.
 Kofoid, Charles A. 1914. *Phytomorula regularis*, a symmetrical Protophyte related to *Coelastrum*. *Univ. of California Publ. in Botany*. 6(2): 35-40.
 Smith, G. M. 1933. *Fresh-water Algae of the United States*. McGraw-Hill Book Co.