what complex structure'. They are perhaps as much like *Lepidocarpon* as *Mazocarpon*.

I trust I have adduced sufficient evidence to show that there is no adequate ground for assuming the existence of a sporangiophoric Lepidophyte. On the other hand, most of the remarkable specimens now for the first time collected and figured by Bassler are welcomed as further examples of Sigillarian microsporophylls, of which we had hitherto only one incrustation record (Kidston, loc. cit., Pl. II, 1, esp. d').

M. BENSON.

ROYAL HOLLOWAY COLLEGE,
UNIVERSITY OF LONDON.

ON THE GEMMAE OF *TORTULA MUTICA*, LINDB. Among mosses, the production of gemmae is a comparatively rare phenomenon, as is seen from the fact that of the six hundred and twenty odd British species adopted by Braithwaite¹ only seventeen are known to reproduce themselves in this manner.

In these seventeen species the form and origin of the gemmae are exceedingly various. They may be red, club-shaped, septate processes which become detached from the margins of the leaf; or they may grow in clusters at the leaf-apex. More complicated gemmae are sometimes met with in the axils of the leaves, and these are often red and may develop directly into bulbils which become detached from the parent plant. In the most highly specialized plants the gemmae are borne within special cups of leaves, or on leafless pseudopodia.

Braithwaite records that in one specimen of *Tortula mutica* which he had examined there were 'minute globular gonidia scattered over the surface of the leaf, not unlike those in *Tortula papillosa*'.² His record is extremely brief, and no figure is given.

Recently, however, a specimen of *Tortula mutica* from North Wales has been examined, and was observed to bear numerous gemmae. They were simple in form and were usually borne scattered over the surface of the leaf. Each consisted, as a rule, of two (Fig. 3) or four (Figs. 2 and 5) cells bounded by thick, reddish-brown cell-walls, and containing dense granular protoplasm and a number of large, circular or somewhat irregular, discoid chloroplasts. Occasionally larger gemmae were found (Fig. 4), and in these the disposition of the cells was more irregular than in the smaller gemmae. The gemmae were attached to the leaf of the mother-plant by means of a single colourless stalk-cell, which grew from the surface of one of the cells of the blade, as shown in Fig. 2. The chloroplasts in the gemmae were very much larger than those in the cells of the leaf-blade, while their colour was a deep bluish-green, far more intense than that observed in the leaf itself.

Much more rarely, gemmae were found growing laterally on protonema-filaments whose walls had assumed a brown colour almost as dark as that of the cell-walls of the gemmae, and whose contents were destitute of chloroplasts. These gemmae were attached to the protonema-filament by means of a short stalk-cell, and rarely consisted of more than two green cells (Fig. 1).

¹ R. Braithwaite: British Moss Flora. London, 1887.

² Loc. cit., i, p. 222.

FIGS 1-5. Gemmae of *Tortula mutica*, Lindb. $\times 825$. 1. 2-celled gemma growing on protonema-filament; 2. 4-celled gemma attached to leaf-blade; 3. Small gemma detached from leaf; 4. Larger gemma beginning to germinate in two places; 5. 4-celled gemma with single young protonema-filament. *b.*, Cell of leaf-blade; *g.*, gemma; *m.*, midrib of leaf; *p.*, protonema-filament; *r.*, resting cell of gemma; *s.*, stalk-cell; *v.*, young protonema-filament.

The gemmae easily became detached from the parent plant by the complete breaking down of the stalk-cell, and then appeared to enter upon a period of rest. They germinated, after a shorter or longer interval, by the outgrowth of a protonema-filament from one of the resting cells. These young filaments had a thin colourless wall, and contained a relatively small number of pale green chloroplasts that were somewhat elongated in the direction of the long axis of the cell.

In the germination of the smaller gemmae a single protonema-filament only was produced (Fig. 5), but in the larger ones sometimes more than one of the resting cells resumed activity, as is shown in Fig. 4, where two young outgrowths are depicted.

These gemmae of *Tortula mutica* differ from those figured by Braithwaite¹ for *T. papillosa* chiefly in their position and mode of attachment. In *T. papillosa*, gemmae occur only on the upper surface of the thickened nerve in the apical half of the young leaves, and are attached by means of a thin stalk which still adheres to the gemma when it becomes separated from the leaf. In *T. mutica*, on the other hand, the gemmae were never observed on the midrib, but grew indiscriminately over the whole of the surface of the leaf-blade, and were found on both old and young leaves, and also on the protonema. Their stalk-cell was broad and comparatively shallow, and no part of it could ever be detected on those gemmae that had become detached from the moss-plant.

I wish to thank Professor G. S. West for providing for this examination the material which had been collected by Mr. E. Cleminshaw.

B. MURIEL BRISTOL.

BOTANICAL DEPARTMENT,
UNIVERSITY OF BIRMINGHAM.

¹ Loc. cit., Tab. XXXII, E. I and II.

Bristol, B. Muriel. 1920. "On the gemmae of *Tortula mutica*, Lindb." *Annals of botany* 34, 137–139. <https://doi.org/10.1093/aob/os-34.1.137>.

View This Item Online: <https://www.biodiversitylibrary.org/item/236972>

DOI: <https://doi.org/10.1093/aob/os-34.1.137>

Permalink: <https://www.biodiversitylibrary.org/partpdf/320281>

Holding Institution

Smithsonian Libraries

Sponsored by

Biodiversity Heritage Library

Copyright & Reuse

Copyright Status: Not in copyright. The BHL knows of no copyright restrictions on this item.

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.