New or otherwise interesting Bryophytes from Crete

by S.R. GRADSTEIN (1)

ABSTRACT

This report deals with the results of the determination of bryophytes collected by the author in 1967 in the western District of Chanià on the island of Crete.

33 species new to Crete were discovered and a number of bryophytes were collected for the first time in the District Chanià. Some species listed here were previously known from only very few European localities: *Riella notarisii, Solenostoma handelii, Rhamphidium rechingeri* and *Trematodon longicollis. Rhamphidium rechingeri* has been found to be conspecific with the west-mediterranean *Rhamphidium purpuratum* Michx.

A few remarks are made on the distribution of the bryophytes on the island. A relatively rich flora of liverworts is present in District Chanià, which is due to a high annual precipitation-rate and to the presence of well-irrigated schistose mountain-areas in this region.

INTRODUCTION

In the period of April 5 - May 15 1967 the author studied hygrophylous vegetations in District Chanià, the western part of the island of Crete, in collaboration with J.H. SMITTENBERG (Gradstein & Smittenberg 1968). During this stay about 300 nrs. of bryophytes were collected on 11 localities (fig. 1). The collections are deposited in the Herbarium of Utrecht University (2). This report deals with the determination of these collections.

A survey of the bryological exploration of the island has been given by DULL (1966). In his very useful paper he summarised our present knowledge of the bryoflora of the island and gave a bryogeographical and bryocoenological sketch. RUNGBY (1967) published a short list of mosses collected on Crete, which included four species not yet mentined by DULL, viz. *Barbula revoluta, Barbula sinuosa, Isothecium filescens* and *Saelania glaucescens.* My collections contain 33 species of bryophytes, among which 11 liverworts not previously known from the island. Several of them appear to be new to the Eastern Mediterranean Region: *Cephalozia connivens, Anomobryum filiforme, Bryum klinggraeffii, Bryum bornholmense, Oncophirus virens* and *Trematodon longicollis.* A number of species from

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(2) Duplicate sets for exchange are available.

my collections which either had not been reported earlier from District Chanià or had been only once, or which are otherwise interesting for various ecological or taxonomical reasons are also listed here. A few data presented here have been derived from a collection of some 35 nrs. of bryophytes gathered by my brother, F.M. GRADSTEIN, on several places on the island in the summer of 1965.

The Cretan bryoflora now numbers 244 species and subspecies, including 47 liverworts and 182 species of mosses. The total number might still increase after a more thorough investigation of the annual and ruderal flora in arable fields, both in the lowlands and in the mountains (on the great mountain plains !), of the flora of the arid eastern part of the island (Silià) and of the abundant flora of the humid schistose mountains (see below). A visit in late autumn, in inter or in early spring might prove to be worth while, especially so in the former two areas.

REMARKS ON THE DISTRIBUTION OF THE BRYOPHYTES ON CRETE

DULL (l.c.) already discussed the distribution of the bryophytes on Crete in connection with the macro-climatological variation. The relatively high precipitation-rate in the western Distr. Chanià ranging from 500 - 600 mm/y in the lowlands to 1100 mm/y in the mountains contributes to the development of rather abundant vegetations of bryophytes, which contain 85 % of the total number of species found on the island. Distr. Chanià can stand as the richest bryological region of all Eastern Mediterrenean Islands. Contrasting with Chanià the arid eastern Sitia District, with a precipitation of only 200 - 350 mm/y in the lowlands increasing with altitude + 50 mm per 100 m, yields only 30 % of the total number of species. This percentage, however, might increase by collecting more intensively in this region. Distr. Chanià differs from the other parts of the island especially in its relatively rich flora of liverworts. 10 foliose liverworts (= 50 % of the total number of foliose liverworts-species known from the island) have exclusively been found in this area: *Calypogeia fissa, Cephalozia connivens, Cephalozia bicuspidata, Chepaloziella turneri, Lejeunea cavifolia, Lophocolea heterophylla, Scapania compacta, Southbya nigrella, Solenostoma atrovirens* and *Solenostoma handelii.*

Nearly all of them were found in the lower schist-mountains, where well-irrigated habitats are provided. These schists are mainly made up of metamorphosed Triassis rocks. Only in the western part of the island they occur on the surface over wide areas (ZOHARY & ORSHAN, 1966). Ranging west of Skinès a fairly large schistose area forms the north-western boundery of the Lèvka Ori (loc. IX, IV). Comparable to this area is the humid region of Trapezunt at the Black Sea, where many Turkish liverworts occur exclusively (HENDERSON, 1961). *Solenostoma handelii* is only known from Trapezunt and Distr. Chanià (loc. IX).

Among the thallose liverworts, which are generally better adapted to arid habitats (JOVET-AST, 1956), 8 species (= 28 % of the total number of thallose species known from the island) are exclusively known from Chanià: *Clevea spathysii, Riccardia pinguis, Riccia macrocarpa, Riccia nigrella, Riella notarisii* and *Sphaerocarpus michelii* from the lowlands, *Metzgeria furcata* and *Riccardia multifida* from the schist-mountains.

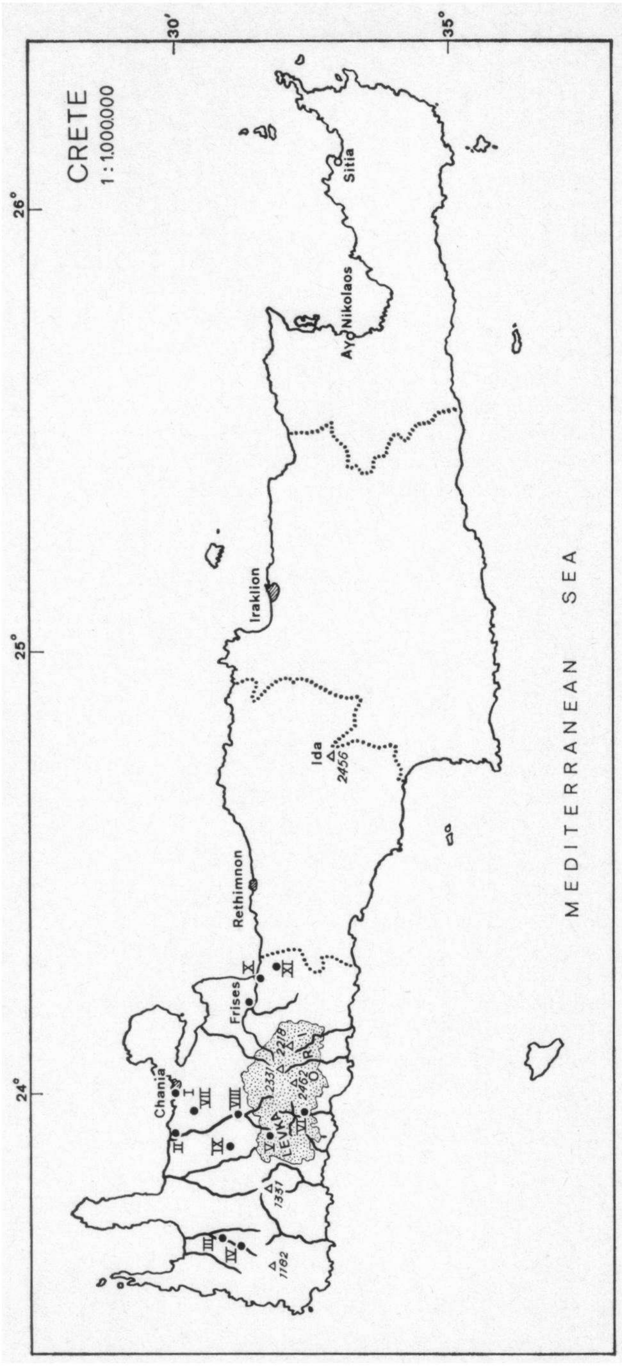
33 Cretan bryophytes are still unknown from Distr. Chanià. Among them there are several Grimmiae, collected only in the mountains of the middle and eastern part of the island: *Grimmia anodon, Gr. laevigata, Gr. ovalis* and *Gr. orbicularis.*

16 species of this group have been found in the lowlands only. All but one (*Bryum argenteum*!) have a predominantly southern distribution in Europe. They include 10 species of Pottiaceae: *Gyroweisia tenuis, Tortella inflexa, Pleurochaete squarrosa, Hydrogonium ehrenbergii, Pottia davalliana, P. crinita, P. lanceolata, Aloina rigida, Crossidium squamigerum, Tortula atrovirens* and *Barbula revoluta.* Most of these species prefer warm, arid habitats. Therefore their absence in Chanià is reasonable.

LIST OF LOCALITIES (*Fig.* 1).

		date 1967	coll. nrs.
I	*Chanià :* arable fields and phrygana near coast, west of Chaniá.	9 Apr.	1055-1072
II	*Platanià̀s :* mouth of river Kerítis and surrounding arable fields.	10, 11, 12 Apr.	1073-1088
III	*Topólia :* entrance of gorge with rich vegetation of bryophytes on steep river banks. alt. 200 m.	14, 15, 16 Apr.	1089-1127 1182-1184
IV	*Katsimatádos :* valley in schist-mountains with many brooks and rivulets; olive groves with many epiphytes, alt. 300 m.	16, 17 Apr.	1128-1188
V	*Omalos :* ruderal vegetation on the plain, alt. 1 000 m; surrounding slopes, alt. 1 100-1 500 m.	20, 21, 22 Apr.	1185-1246
VI	*Samariá :* gorge between Samariá and Xyloscála, Lévka Ori. alt. 500-1 100 m.	23 Apr.	1247-1264
VII	*Agiá :* artificial lake with well developed hygrophylous vegetation. alt. 50 m.	26 Apr.	1265-1276
VIII	*Méskla :* old wall along road. alt. 500 m.	30 Apr.	1277-1282
IX	*Lagós :* valley between Skinés and Néa Roúmata near Lagós; luxuriant vegetation of bryophytes along road on artificial schistose walls wetted by numerous springs and rivulets. alt. 250-350 m. V.	4, 5, 6 May	1283-1340
X	*Georgioúpolis :* brackish springs and spring-rivers rising along the coast.	10 May	1341
XI	*Kournás :* banks of the lake deprived of other vegetation by artificial fluctuation of the water-level. alt. 50 m., habitat of *Riella notarisii.*	12 May	1342-1343

V Locality of *Solenostoma handelii, Rhamphidium purpuratum* and *Trematodon longicollis* !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2218
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1182
MEDITERRANEAN SEA

FIG. 1.

LIST OF SPECIES

Abbrev : " new to Crete
' new to District Chania

HEPATICAE

" *Calypogeia fissa* (L.) Raddi

IX In shaded places, on wet schists and along brooks in the maquis. 1300 (c.sp.), 1310, 1325.

" *Cephalogia bicuspidata* (L.) Dum. aff. var. *lammersiana* (Hüb.) Breidl.

IX On shaded, wet schists, with *Solenostoma handelii, Pogonatum nanum, Fissidens rivularis* and *Lejeunea cavifolia.* 1308 (c.sp.) My material seems to represent an intermediate form. The plants are tiny, pale-green, the cells in the centre of the leafs are (45-) 55-65 (-80) x 35-50 μ., the cortical cells are 75-105 x 40-60 μ. The leaflobes are 5-7 cells wide with long points, the antical lobe generally being wider than the postical lobe. According to GROLLE (in litt.) this form might be a modification of *C. bicuspidata.* The var. *lammersiana* has not yet been reported from S.E. Europe.

" *Cephalozia connivens* (Dicks.) Spruce

IX On exposed, wet schists with *Solenostoma handelii.* 1295 (c.per.) Isolated occurence. In the Mediterr.-region this subatlantic species has been reported from Corsica and from the Atlantic Islands (MULLER, 1956).

" *Cephaloziella turneri* (Hook) Muell.

IV Under a silicious boulder on a N.-exposed slope, shaded, 1172 (c.per.).

IX On wet schists. 1311 (c.per.).

In both localities creeping in between *Gongylanthus ericetorum* and *Scapania compacta.*

' *Conocephalum conicum* (L.) Dum.

IX On steep, shaded schists in the maquis, splashed by a waterfall. With *Woodwardia radicans* (!), *Pellia fabbroniana, Calypogeia fissa* and *Bryum pseudotriquetrum.* 1320.

Fossombronia angulosa (Dicks.) Raddi

I Along a path in the phrygana. With *Bryum donianum, Phaeoceros laevis, Fissidens bryoides* and *Trichostomum mutabile.* 1068 (c.sp.).

III On steep, loamy bank of the river, aboundant. With *Lunularia cruciata, Phaeoceros laevis, Bryum donianum, Trichostomum mutabile* and *Rhynchostegiella tenella.* 1101 (c.sp.).

IV On shaded bank of a brook, with *Eucladium verticillatum.* 1159 (c.sp.).

' *Frullania dilatata* (L.) Dum.

III On *Platanus orientalis.* 1111 (c.sp.).

IV In an orchard, both on *Olea* (cortex rough) and *Prunus* (cortex smooth), with *Orthotrichum diaphanum, Tortula laevipila* and *Habrodon perpusillus.* 1134. 1136 (c.per.).
On siliceous boulder along a brook in the maquis, wih *Frullania tamarisci, Pterogonium, Grimmia trichophylla.* 1146 (c.per.).

'Frullania tamarisci (L.) Dum.
IV With *Frullania dilatata* (1146). 1145.

" Lejeunea cavifolia (Ehrh.) Lindb.
III On *Platanus orientalis.* 1119.
IV On shaded schists along a brook in the maquis. With *Metzgeria furcata.* 1153 (c.per.).
IX On shaded schists and on loamy banks of brooks, with *Metzgeria furcata.* 1303 (c.per.), 1338 (c.per.).

" Lophocolea heterophylla (Schrad.) Dum.
IX On loamy banks of a brook in the maquis. With *Lejeunea cavifolia, Fissidens bryoides, Plasteurhynchium duriaeanum* and *Trichostomum mutabile.* 1339 (c.per.).

" Metzgeria furcata (L.) Dum.
IV With *Lejeunea cavifolia* (1153). 1154.
IX With *Lejeunea cavifolia* (1303). 1302.
On a silicuous boulder and at the base of *Platanus* along a brook. With *Radula lindbergiana, Zygodon, Leptodon* and *Scorpiurium.* 1336.

'Pellia fabbroniana Raddi (= *P. endiviaefolia* Dum.).
IV On wet soil near artificial spring frequented by mules. With *Calliergonella cuspidata* and *Eurhynchium praelongum.* Char. spec. of Ass. *Acrocladio-Adiantetum* (GRADSTEIN & SMITTENBERG, 1968). 1156.
IX In a ditch on muddy schists near a spring, with *Calliergonella, Riccardia multifida* and *Calypogeia fissa.* Ass. *Acrocladio-Adiantetum.* Also at waterfall with *Conocephalum.* 1326.

Radula lindbergiana Gottsche
IV At the base of an old *Castanea,* with *Plasteurhynchium duriaeanum.* 1147. In fissures of silicuous boulders on a N.-expos. slope, with *Frullania tamarisci, Leptodon* and *Pterogonium.* 1171.
IX With *Metzgeria furcata* (1336). 1337 (c.per.).

" Riccardia multifida (L.) S.F. Gray
IX On steep, wet schists, hidden in dense maquis. 1291 (c.sp.), (1326).

Riccia michelii Raddi
I On loamy soil along the river in vegetation of *Juncus* « heldreichianus ». With *Corsinia coriandrina, Riccia sorocarpa, Barbula unguiculata, Pottia mutica* and *Pottica recta.* 1059.
V In a snowpath at 1500 m., abundant. 1244 (c.sp.).
VII In open, burned vegetation of *Schœnus nigricans* on naked soil along the lake. With *Phaeoceros laevis, Bryum bornholmense, Funaria hygrometrica* and *Weisia controversa.* 1267.

First finds in the lowlands of the islands.

Riccia sorocarpa Bisch.

I With *Riccia michelii* (1059). 1060.

" *Riella notarisii* Mont.

XI Abundantly creeping in the mud on the flat bank on the western side of the lake, just above the water. With *Bryum klinggraeffii* 1342 (c.sp.).

Plants up to 8 mm long, furcate at base. Axis bearing one or more short young branches, 0,2 - 0,3 mm wide. Wings up to 2 mm wide, hardly undulate, becoming deficient towards base of axis. Scales inconspicuous, on both sides of axis, up to 1 mm long; on young branches and near growing apex linguiform with curved apex, near stembase wider, ovato-oblong.

Involucra ovoid, acuminate, with asymmetric apex, up to 1 1/2 mm long, unwinged. Cells strongly mammillate near apex, quadrate, 30-35 μ. Spores rounded, 65-75 μ (spines included), densely spined with spines 7-8 μ, these spines being dilated at apex and connected at base forming irregular reticulations. According to Müller (1908, p. 323) there is one uncertain record of this species from the E.-Mediterr. region (Phalerus near Athens, leg. Chaboisseau 1887 fide Stephani).

" *Scapania compacta* (Roth.) Dum.

IV With *Cephaloziella turneri* (1172). 1173.

IX On wet, exposed schists with *Gongylanthus ericetorum, Ditrichum subulatum, Funaria* attenuata and *Hypnum cupressiforme.* 1315.

Solenostoma handelii (Schiffn.) K. Muell.

IX On exposed, wet schists in the vall 1294 (c.sp.), 1307 (c.sp.), (1309). « Trapezunt (Turkey) and Crete. The species also has been reported from Honshu, Japan by AMAKAWA. — *Jour. Hattori Bot. Lab. 22*: 63-64, fig. 37.1960 (sub nom. *Jungermannia handelii* (Schiffn.) Amak.

" *Sphaerocarpus michelii* Bell.

I On steep, clayish riverbank under *Juncus* « heldreichianus ». 1056.

II Abundantly in fields of *Medicago sativa* near the coast, with *Pottia mutica* and *Bryum klinggraeffii.* 1076.

This species, common in the Mediterr. region, has quite obviously been overlooked on the island.

MUSCI

Aloina ambigua (B.S.G.) Limpr.

II On a mound of clay, with *Barbula unguiculata, Bryum radiculosum, Fissidens incurvus, Didymodon tophaceus, Funaria hygrometica* and *Tortula marginata.* 1078 (c.sp.).

" *Anomobryum filiforme* (Dicks.) Husn.

IX On steep, shaded, wet schists, with many other acrocarpous species: *Anisothecium varium, Didymodon tophaceus, Gymnostomum calcareum, Mniobryum delicatulum* and *Trichostomum mutabile.* 1333 (c.sp.).

"*Barbula fallax* Hedw., with bulbils !

V At the edge of a muddy spring in the plain, frequently visited by sheep. On disturbed, humid soil.

This form is remarkable by its irregularly spherical to ovate, brownish bulbils, 60-100 (-160) μ in largest diam., with large 20-30 μ long, protuberant cells. The bulbils develop on short, leaf-borne rhizoids. Occasionally a cluster of long-stalked bulbils can be found hidden between the apical leaves. The plants have a brownish, depauperate appearance, which might be caused by growth under bad conditions. On less disturbed soil in the area well-developed material of the species without bulbils has been collected. In this widely distributed species this seems to be the first record of bulbils.

' *Bartramia stricta Brid.*

IV With *Cephaloziella turneri* (1172). 1179 (c.sp.).

IX On wet schists, with *Rhamphidium purpuratum, Pohlia annotina* var. *decipiens, Anisothecium varium* and *Trichostomum mutabile.* 1304 (c.sp.).

Brachythecium velutinum (Hedw.) B.S.G. var. *condensatum* B.S.G.

V On bark of *Prunus amygdaloides* in the plain. 1210 (c.sp.).

This variety is characterised by its short, erect branches and its almost glabrous seta. DULL (l.c.) does not mention this variety from the Omalos.

' *Bryum alpinum* With.

V In a muddy, grassy well in the plain, frequented by sheep. 1223 (with tubers !). det. OCHI.

My specimens are marked by the leaves having « dicranum-like » reddisch-brown, concave auricles with thin-walled, quadrate cells. These auricles are especially distinct in older leaves, in which they are clearly separated from the prosenchymatic, hyaline leaf-cells, which become wider towards the base.

Checking descriptions of the species in DIXON (1924), GROUT (1940) and NYHOLM (1958) I did not find this character mentioned. The occurence of tubers in this species has been discovered by WHITEHOUSE (1966).

" *Bryum bornholmense* Winkelm. & Ruth.

VII With *Riccia michelii* (1267). 1266 (tubers). Det. NYHOLM.

Bryum canariense Brid.

III On dry, calcareous boulders along the river, with *Tortella nitida* and *Gymnostomum calcareum.* 1109, 1125 (with tubers).

The occurence of tubers in this species has been discoverd by Whitehouse (1966).

' Bryum donianum Grev.

I With *Fossombronia angulosa* (1068), 1069 (c.sp.).

III Abundant on steep bank of the river, with *Foss. angulosa* (1101). 1106 (c.sp.).

V On open, loamy soil along a rivulet on the plain. Habitat slightly ruderal. With *Fossombronia pusilla, Funaria dentata* (1), *Oxyrrhynchium praelongum* and *Pogonatum nanum.* 1217.

It is doubtful whether 1217 belongs to *Br. donianum* (NYHOLM, in litt.). The plants are robust, the stems are up to 4 cm high. The leaves are oblong-spathulate, up to 4,5 (!) cm long, with a strong nerve which is hardly excurrent. The leafmargin is very distinct, multistratose, 40-50 μ wide.

I sent material to Dr. NYHOLM and to Dr. STORMER and both of them were in doubt as to its determination. Since the plants are rather chlorotic and sterile I hesitate to describe them as a new species.

" Bryum klinggraeffii Schimp.

II With *Sphaerocarpus michelii,* abundant (1076). 1075 (tubers) Det. NYHOLM.

XI With *Riella notarisii* (1342), very scarce. 1343 (with tubers).

Isolated occurence. Known from West and Central Europe (CRUNDWELL & NYHOLM, 1966). Plants without sporophytes obviously overlooked, as is the case in all the *Brya Erythrocarpa.*

" Bryum pseudotriquetrum (Hedw.) Schwaegr.

IX With *Conocephalum conicum* (1320). 1321.

' Bryum radiculosum Brid. (= *Br. murale* Wils.).

II With *Aloina ambigua* (1078). 1083 (tubers). Det. NYHOLM.

" Calliergonella cuspidata (Hedw.) Loesk.

IV With *Pellia fabbroniana* (1156). 1157.

IX With *Pellia fabbroniana* (1326). 1327.

Ceratodon purpureus (Hedw.) Brid.

V Common on the plain in exposed, ruderal habitats. Often growing together with *Pleuridium subulatum, Funaria dentata, Phaeoceros laevis* and *Hymenostomum microstomum.* 1214, 1237, (1225), (1222).

This species has only recently been recorded from the lowlands, near Knossos (RUNGBY, 1967).

Cinclidotus aquaticus (Hedw.) B.S.G.

VIII In running water on an old wall along the road. With *Mnium affine* var. *elatum, Oxyrrhynchium speciosum, Scorpiurium circinatum* and *Dialytrichia mucronata.* 1282.

" Cratoneuron commutatum (Hedw.) Roth

VI In a calcareous spring at 700 m. Char. spec. of the Ass. *Eucladio-Adiantetum* (GRADSTEIN & SMITTENBERG, 1968). With *Eucladium*

(1) The affinity of the material of this species from the Omalos to the doubtful species. « *F. pustulosa* Zodda » has already been mentioned by DÜLL (l.c.).

verticillatum, Leiocolea turbinata, Rhynchostegiella tenella and *Scorpiurium circinatum* (a sturdy form). 1250.

'Cratoneuron filicinum (Hedw.) Spruc.

II On stones along a ditch in running water. 1068.

VII On bricks in shallow, running water in the outlet of the lake, abundant. With *Philonotis fontana* and *Fontinalis duriaei.* 1275.

Collected only once by DULL in the Zeus cave at Mount Ida as a « Schattenform », this species does not seem to be uncommon in irrigation ditches in the lowlands, where it grows with *Hygroamblystegium tenax* and *Pellia* cf. *fabbroniana.*

'Crossidium chloronotos (Brid.) Limpr.

II On the wall of an old farmhouse, with *Tortula marginata.* 1088 (c.sp.).

Dialytrichia mucronata (Brid.) Broth. (= *Cinclidotus mucronatus* (Brid.) Moenk. et Loesk.)

III On *Platanus orientalis,* in a hollow in between two branches, 2 m above ground. With *Scorpiurium circinatum* and *Homalothecium sericeum.* 1116 (c.sp.).

VI On *Prunus amygdaloides,* near Samaria, 500 m., with *Orthotrichum diaphanum* and *Zygodon viridissimus.* 1258.

VIII With *Cinclidotus aquaticus* (1282). 1281.

"Ditrichum subulatum Hamp.

IX With *Scapania compacta* (1315). 1313 (c.sp.).

" Epipterygium tozeri (Grev.) Lindb.

IV On shaded bank of a brook, at the *bottom* of a waterfall in the maquis. With *Fissidens taxifolius, Rhynchostegiella tenella.* 1317. Also on wet schists, with *Solenostoma handelii* (1307).

This species has recently been discovered in W. Turkey (WALTHER & LEBLEBICI, 1969).

Fontinalis antipyretica Hedw.

V In a cistern in the plain, with *Batrachium aquatilis.* 1265 (c.sp.).

IX In a ditch along the road in running water. 1283.

X Near the mouth of the spring-river in deep, running, brackish water. Abundant, in between *Potamogeton pectinatus* and Algae. 1341.

Raulin's old record (1869) is now confirmed. 1341 is an abnormal form ; the young leaves are more less plane, the older ones slightly keeled with the keels partly split. The plant has only seldom been collected in brackish water.

Fontinalis duriaei Schimp. (= *F. hypnoides* Hartmann var. *duriaei* (Schimp. Husn.)

II In a puddle in the dried-up part of the river. Also in an irrigation ditch. 1085.

VIII In deep running water in the outlet of the lake, sitting on wooden piles. 1276.

This species was collected once by RECHINGER on the Omalos « in einer Zisterne ». This was where I gathered *F. antipyretica* (1265).

Funaria attenuata (Dicks.) Lindb. (= *Enthostodon templetonii* (Sm.) Schwaegr.).

IX With *Scapania compacta* (1315). 1312 (c.sp.).

Grimmia trichophylla Grev.

IV On *Quercus coccifera*. 1168.

VI On a horizontal branch of *Platanus orientalis*, 700 m. With *Leucodon sciuroides* var. *morensis*. 1257.

First record of epiphytic habitats on the island.

Leptodictyum riparium (Hedw.) Warnst.

Frisés, at the base of *Olea europea*. Leg F.M. GRADSTEIN, 1965, nr 7a.

II On an old trunk in *Phragmites* vegetation along the river. 1073.

Mniobryum delicatulum (Hedw.) Dix.

IX With *Anomobryum filiforme* (1333). 1334.

Mnium affine Funck var. *elatum* B.S.G. (= *Mnium seligeri* Jur.).

VIII With *Cinclidotus aquaticus* (1282). 1278.

Mnium hornum Hedw.

IX On wet schists near a spring, hidden in dense maquis. With *Riccardia multifida*. 1293.

A form with leaves strongly crisped when dry.

Oncophorus virens (*Sw.*) *Brid.*

V On *Cupressus sempervirens* in the plain near Xyloscala, 1100 m. With *Dicranoweisia cirrhata, Habrodon, Zygodon* and *Antitrichia californica* s.l. 1261 (c.sp.).

Isolated occurence. Widely spread in the mountains this species ranges south to Sierra Nevada and to Yugoslavia (PAVLETIC, 1955). The occurence of *Oncophorus* on a Mediterr. island has been reported once by HERZOG (1910). It was gathered in Sardinia in a habitat comparable to the Cretan habitat: « auf einem morschen Baumstrunk am Weg, ca. 1100 m ». HERZOG (l.c.) described his specimen as a new species, *O. sardous*, which, according to his description, differs from *O. virens* by the lack of distinct alar cells and by a short capsule with a faintly developed struma and a short peristome. I doubt whether these differences are sufficient reason to distinguish « *O. sardous* » as a separate species from *O. virens*. My specimens also show indistinct alar cells and a minute struma, which suits the morphological variation in *Oncophorus virens*.

Pleuridium subulatum (Hedw.) Rabenh.

V Abundant on open soil in the plain, with *Ceratodon purpureus*. 1213 (c.sp.), 1224, (1228).

Pogonatum aloides (Hedw.) P. Beauv.

IX On shaded, wet schists with *Solenostoma handelii*. 1308.

Pogonatum nanum (Hedw.) P. Beauv.

V On steep bank of a rivulet in the plain, with *Funaria dentata*. 1124 (c.sp.).

" *Pohlia annotina* (Hedw.) Lindb. var. *decipiens* Loesk. 1906.
(= P.a. var. *loeskei* Crum, STEERE & ANDERSON, 1965).
IX On vertical, shaded side of a path at a spring in Lagos, with *Trematodon longicollis* and *Calypogeia fissa*. 1299.
On wet schists in between tufts of *Rhamphidium purpuratum*. (1306).

The Index Muscorum (1965) follows Koch (1951) in rejecting the « confusing » name *Pohlia annotina* (Hedw.) Lindb. and replacing it by *Pohlia camptotrachela* (Ren. et Card.) Broth. The rejection of the name, however, has not been based on a study of the type of *Bryum annotinum* Hedwig which should be the legitimate basionym. Dr. FLORSCHUTZ kindly informed me that the Hedwigian name is nicely illustrated by a plant which is clearly a *Pohlia* (Spec. Musc. 1801, Tab. XLIII). Hence, KOCH's correction does not seem to be justified.

The Index Musc. suggests the var. *decipiens* to be included in the type of the species « fid. ANDREWS in GROUT, Moss Fl. N.Am. 2: 199 ». In my opinion, the Index here gives an incorrect interpretation of Andrew's account on this taxon, who states in his description of *Pohlia annotina:* « gemmae... varying from small ovate to cuneiform and (in var. *decipiens* Loeske) elongated twisted-vermiform, generally with 3-4 acute erect leaf-points » (p. 200). Besides, the var. *decipiens* is not included in his list of synonyms under *P. annotina*.

ANDREWS (l.c.) and NYHOLM (1958) emphasize the rather intermediate position of the var. *decipiens* between *P. annotina* and *P. proligera* (Kindb.) Arn. in respect of the gemmae. In my collection nr. 1299, which consists of small gemmae-bearing plants mixed with stouter plants without gemmae, typical short and wide-ovate gemmae seldom occur isolatedly in the leafaxils, while vermiform gemmae are numerous and generally 2-6 per leaf. In 1306 short gemmae occur more frequently. The leaves of both coll. fit in the description of *P. annotina* (Hedw.) Lindb. as given by NYHOLM (l.c.).

" *Polytrichum juniperinum* Hedw.
IV With *Bartramia stricta* (1179). 1180.

Pottia mutica Vent.
I, II In arable fields on clayish soils along the coast, abundantly fruiting. With *Bryum radiculosum, Bryum klinggraeffii, Pottia recta* and *Barbula unguiculata*. 1058, 1074.

Pottia recta (With.) Mitt. (= *Pottiella recta* (With.) Gams).
I With *Pottia mutica* (1058), fruiting. 1054, 1057, 1062.

Rhamphidium purpuratum Mitt. (=*R. rechingeri* J. Baumg. *Syn. nov.*).
IX In dense tufts growing on steep, wet schists along the road, 1 km. west of Lagos. With *Anisothecium varium, Bartramia stricta, Pohlia annotina* var. *decipiens* and *Trichostomum mutabile*. 1306. Plants forming pale-greenish tufts, 0,7-1 cm high, abundantly fruiting. Capsules without spores: archesporium aborted by the invasion of mucous colonies of microorganisms into the theca.

Rhamphidium rechingeri was described by BAUMGARTNER (1943) from the same locality (leg. K.H. RECHINGER, Mai 28, 1943). No new localities of the species have been discovered since.

BAUMGARTNER observed the affinity of *R. rechingeri* to *R. purpuratum* Mitt., known from the Azores (type-loc.), Madeira and N. Portugal. He distinguished the Cretan species from *R. purpuratum* by the shorter leaves with a gradually narrowing lamina, straightened when moist, and by the more bluntish-denticulate leaf-apex with the nerve ending below it. By lack of well-developed sporophytes - there were only two capsules, also without spores (!), which according to BAUMGARTNER were in bad shape - the distinction of the new species remained uncertain.

BAUMGARTNER based his conclusions on an examination of one coll. of *R. purpuratum* from the HERZOG Herbarium, which was evidently not the type (1). By courtesy of the curator of the Mitten Herb., Dr. G. SMITH, I was able to study the type of this species in N.Y. The type (Azores, St. Michael, leg. GODMAN s.d.) is represented by two large, brown-greenish tufts with stems up to 2 cm long, abundantly fruiting.

Additional collections of the species have been examined in Leiden (Madeira, Ribeiro da Medade, leg. FRITZE 1880 ; also in P and NY) and Paris-Herb. Pot. de la Varde (Azores, St. Michael, leg. PERSSON, 1937 ; N. Portugal, near Caldillas, leg. LUISIER sept. 23, 1943 (1). In Paris I also saw a sterile syntype of *R. rechingeri.* The kind assistance of the curators, Mrs. S. JOVET-AST (Paris) and Dr. A. TOUW (Leiden) is thankfully acknowledged here.

In my opinion, these collections belong to one species, *R. purpuratum* Mitt. (2). The sporophyte in this species is remarkable uniform. The gametophyte, however, shows considerable morphological variability which will be described here :

Stems 0,5 (coll. LUISIER, RECHINGER) to 2 (coll. GODMAN) cm long. Stemleaves 1,4-2 mm long, perichaetial-leaves up to 3,5 mm, rarely 4 mm (coll. FRITZE). Lamina (= leaf without sheath) 0,6-0,9 (-1,2) mm long. Leaves often with large auricles below zone of transition of sheath into lamina.

The most variable character seems to be the width of the lamina at base, which depends on the rapidity with which the sheath narrows into the lamina. In coll. FRITZE the laminae are only 0,11-0,17 mm and the sheath are rather abruptly narrowing, in the other coll. the laminae are mostly wider, 0,15-0,30 mm and the sheath are less abruptly narrowing.

In general, the narrowing is more abrupt in older leaves than in younger leaves.

(1) He might have seen the well-distributed Fritze coll. from the GEHEEB Herb., which specimens are remarkable by their narrow, long leaves (see descr.).

(2) This erronously has been recorded as the first find of the genus *Rhamphidium* in Europe, the Cretan specimens being collected 4 month earlier !

(3) Illustrations in MITTEN (1870), GEHEEB et HERZOG (1910) and WINTER (1913, sub nom. *Dicranella teneriffae*).

The nerve mostly ends just below leaf-apex. The apex is rather bluntly denticulate, the leaf-margin higher up may be irregular-dentate (coll. LUISIER) to nearly entire (coll. PERSSON, RECHINGER).

" *Seligeria pusilla* (Hedw.) B.S.G. var. *acutifolia* (Lindb.) Schimp.
V In a strongly shaded fissure of a calcareous boulder, 1100 m. 1198 (c.sp.).

The species itself, known from the Zeus cave at mount Ida, has recently been discovered in W. TURKEY (WALTHER & LEBLEBICI, 1969).

Tortella nitida (Lindb.) Broth.
III On a silicuous boulder, abundantly fruiting. 1110.
On *Platanus orientalis*, scarce, with *Orthotrichium diaphanum*. 1124.

Only plants without sporophytes were known from Crete. According to DIXON (1924) sporophytes are very rare in this species. The epiphytic habitat is also unusual.

' *Tortula laevipila* (Brid.) Schwaegr. *var. meridionale* (Schimp.) Wijk et Marg. (= T.l. *laevipiliformis* (de Not.) Limpr.).
IV On *Olea*, with *Habrodon* and *Frullania dilatata*. 1134 (c.sp.).
III On *Platanus*, with *Zygodon* and *Orthotrichum diaphanum*. 1182, (c.sp.).
VII Idem loc. III. 1171 (c.sp.).

" *Tortula virescens* (de Not.) de Not. (= *T. pulvinata* (Jur.) Limpr.).
VI On *Platanus*, 800 m. With *Zygodon viridissimus*. 1254.

' *Tortula vahliana* (Schultz) de Not.
Frises, at the base of *Olea europea*. leg. F.M. GRADSTEIN, 1965, nr. 7b.

" *Trematodon longicollis* Michx.
IX With *Pohlia annotina* var. *decipiens* (1299). 1298 (c.sp.).

Very rare in Europe, a few localities along the coast of S. Italy (Pantelleria, Ischia and Pozzuoli near Napels).

The European « loco classico » is the island of Ischia where the plant was discovered in 1864 by BOLLE, who described it as a new species: *Trematodon solmsii* Bolle 1865. The new species soon appeared to be identical to *Trematodon longicollis* Michaux, at that time only known from S.E. United States (Massachussets to Florida), Cuba and Mexico.

In recent times a number of « species » in *Trematodon* from the West Indies, Pacific, India and E. Asia, many of them being geographic species described by C. MUELLER, have been proved to be conspecific with *Tr. longicollis* Michx. (vide BARTRAM, 1949, CRUM & STEERE, 1957, TAKAKI, 1962).

The species now appears to have a mainly subtropical-holarctic distribution with optimal occurence in Japan and Eastern U.S.A. (vide fig. 2).

" *Weisia controversa* Hedw.
VII With *Riccia michelii* (1267). 1268 (c.sp.).

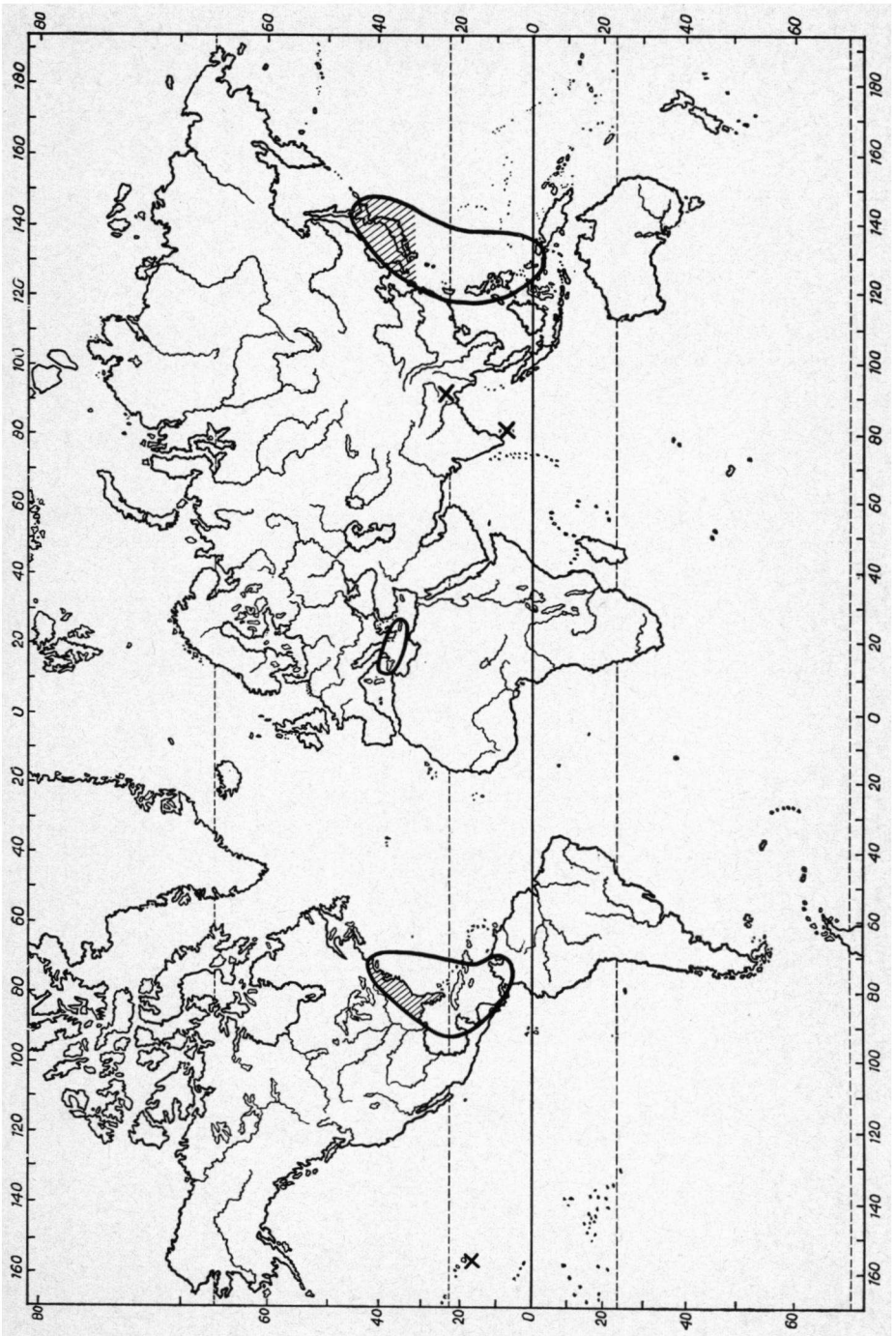

FIG. 2. — Distribution of *Trematodon longicollis* Michx.

Zygodon viridissimus (Dicks.) Brid.

One of the most common epiphytes in the region, often growing together with *Orthotrichum diaphanum*. Collected mostly from *Platanus*, rarely from *Cupressus* or *Prunus*, never from *Olea*.

*
* *

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