

clerici solution (Sp gr. 4 2) gives the pure zircon concentrate. Further purification is done by handpicking.

Characteristics of zircons: The studied zircons are colourless to pinkish brown (Figure 1). Seventeen percent of the zircons are metamict with rounded, dark, euhedral crystals. Fifty nine percent of the zircons are euhedral with simple and complex pyramidal



Figure 1. Zircons from quartzo feldspathic gneiss, Kottayam district, Kerala.

terminations. Thirty-two percent of the terminally rounded crystals have their long axis parallel to the c-axis. Nine percent of the zircon possesses overgrowths; the shell and core being either euhedral or with rounded terminations. A few crystals show zoning and a few are constricted at the middle indicating effects of corrosion. Rounded, globular, and rod-like inclusions are common.

Size-Frequency Studies: The length (L), breadth (B) and the elongation ratio frequency (L/B) curves are shown in figure 2. The length and breadth frequency curves are unimodal with a prominent peak at 0.125 mm and 0.025 mm respectively. The elongation ratio frequency curve is also unimodal with a sharp peak at 2.5.

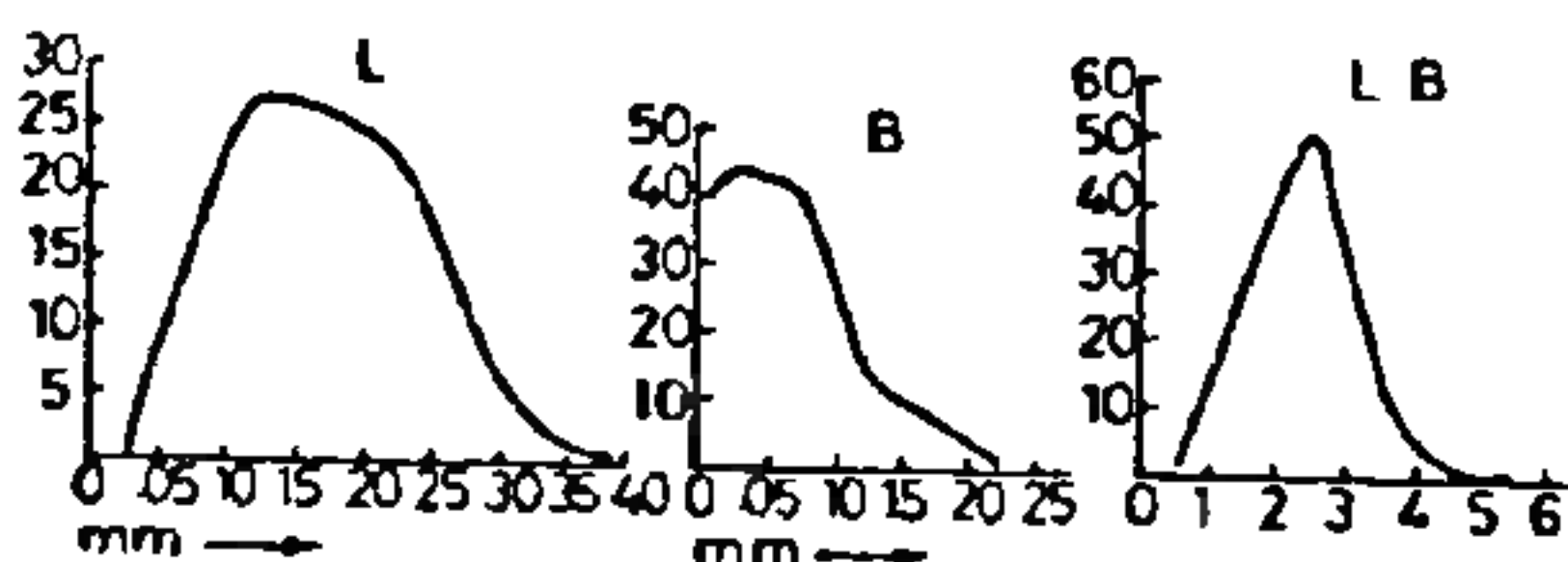


Figure 2. Size frequency curves for zircons from Mundakkayam, Kerala.

Reduced Major Axis: RMA is regarded as a growth trend pattern for the zircons in the gneiss and is shown in figure 3. The RMA when extended passes through the origin indicating that the zircons are self-nucleated¹⁵⁶

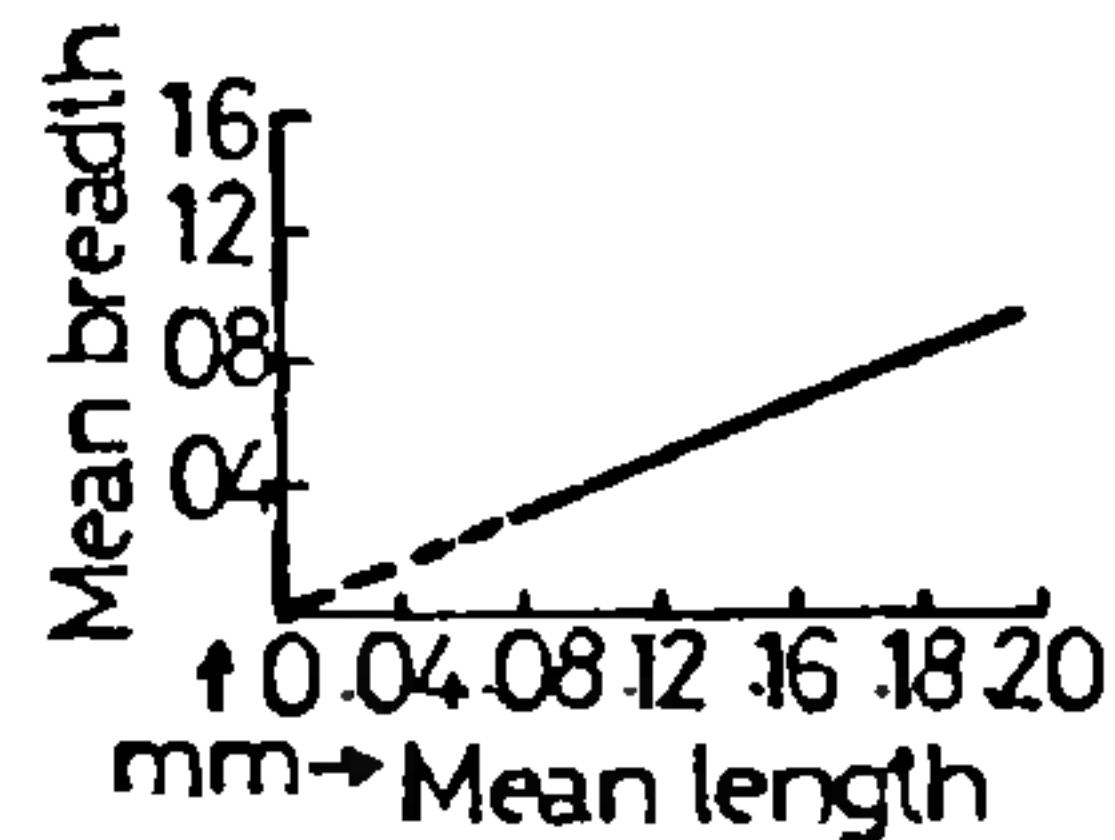


Figure 3. RMA for zircons in quartzo feldspathic gneiss.

The zircons show a high percentage of euhedral crystals. These crystals are of one type with an unimodal peak in their elongation ratio-frequency curve, the prominent maxima being well above 2.0. Negligible percentage of overgrowths are noticed. The RMA suggests that the zircons are self-nucleated. Thus, the features, in general, are suggestive of magmatic origin of the gneiss studied.

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RARE RADIOACTIVE PERPOTASSIC ALKALI SYENITES FROM PARTS OF SOUTH SIKKIM, INDIA

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RADIOACTIVE syenite with high Nb content (ca. 250 ppm) was first reported by Roy and Gupta

(unpublished report, A.M.D., 1972) and later by Sagar *et al*¹ from the Rongang-Simkara tract of Sikkim attributing the radioactivity to naegite and sphene. Field investigations led to the location of a number of similar syenitic bodies in the area. Laboratory studies led to identifying them as belonging to a rare saturated perpotassic peralkaline type, probably being reported for the first time from a plutonic setting. This preliminary note deals with the brief geological setting and broad petrographic and chemical characteristics of the syenite. A detailed account on the petrography and petrochemistry of these rocks will be presented elsewhere.

Geological Setting: The Rangit valley exposes a folded sequence of Dalings (Lower Proterozoic) and Buxas (Middle to Upper Proterozoic-early Paleozoic) thrust over the Lower Gondwana formations in a tectonic window, the 'Rangit window'²⁻⁴

The syenites occur as dyke-like bodies with a general NW-SE trend along fault zones in the Daling and Buxa group of rocks. The dykes are traceable for a few metres to over 200 m. in length and are recorded at many localities like Gompadanda (27° 09' 20" N. Lat.: 88° 24' 30" E. Long.) in the southeast through Maniram Bhanjan, Jaubari, Chimche and Damthang (27° 13' 45" N. Lat.: 88° 22' 47" E. Long.) in the northwest. At some places like Chimche, the syenites exhibit chilled borders with the country rock. Occasionally, they have also a 'boudin-like' character, and are enclosed by the Daling phyllites, as is seen on the footpath from Maniram to Gompadanda, suggesting their involvement in the thrust movements of the area.

Petrography and Petrochemistry: The syenite is mesocratic to melanocratic and generally medium-grained; fine and coarse varieties are also seen occasionally. Some contain megacrysts of K-feldspar veined by mafic minerals and opaques. Microscopically, the rock is hypidiomorphic granular in texture and consists of K-feldspar (50 to 60% by volume; dominant orthoclase with a little microcline), sodic pyriboles (25-40%; reibeckite, kataphorite and aegirine-augite) and opaques (4-7%; ilmenite and magnetite). (Modal ranges based on the study of five samples). Accessories include quartz, apatite, calcite, albite, monazite, zircon, naegite and sphene.

Chemically, based on the analysis of seven samples, the syenite is characterized by (i) 57-60% SiO₂, (ii) approximately equal amounts of Al₂O₃ and total iron

oxides (ca. 10% each), (iii) 7 to 11% K₂O and about 2% Na₂O, (iv) high K₂O/Na₂O ratio of the order of 4 to 8, (v) agpaite index of more than one and upto 1.5, (vi) high Nb (150 to 400 ppm), Zr (more than 1000 ppm), Y (60-160 ppm), Sr (570 to more than 1000 ppm) and (vii) 0.003 to 0.01% U₃O₈ and 0.01 to 0.04% ThO₂ with Th/U ratio of the order of 3 to 4. The determination of trace elements was done by emission spectrograph whereas U and Th by gamma ray spectrometry.

The chemical distinction of these syenites from other K-rich rock types like Orendites, Kamafugites as well as peralkaline granites and syenites is shown in the Na₂O-K₂O-(CaO + MgO) trilinear diagram (figure 1).

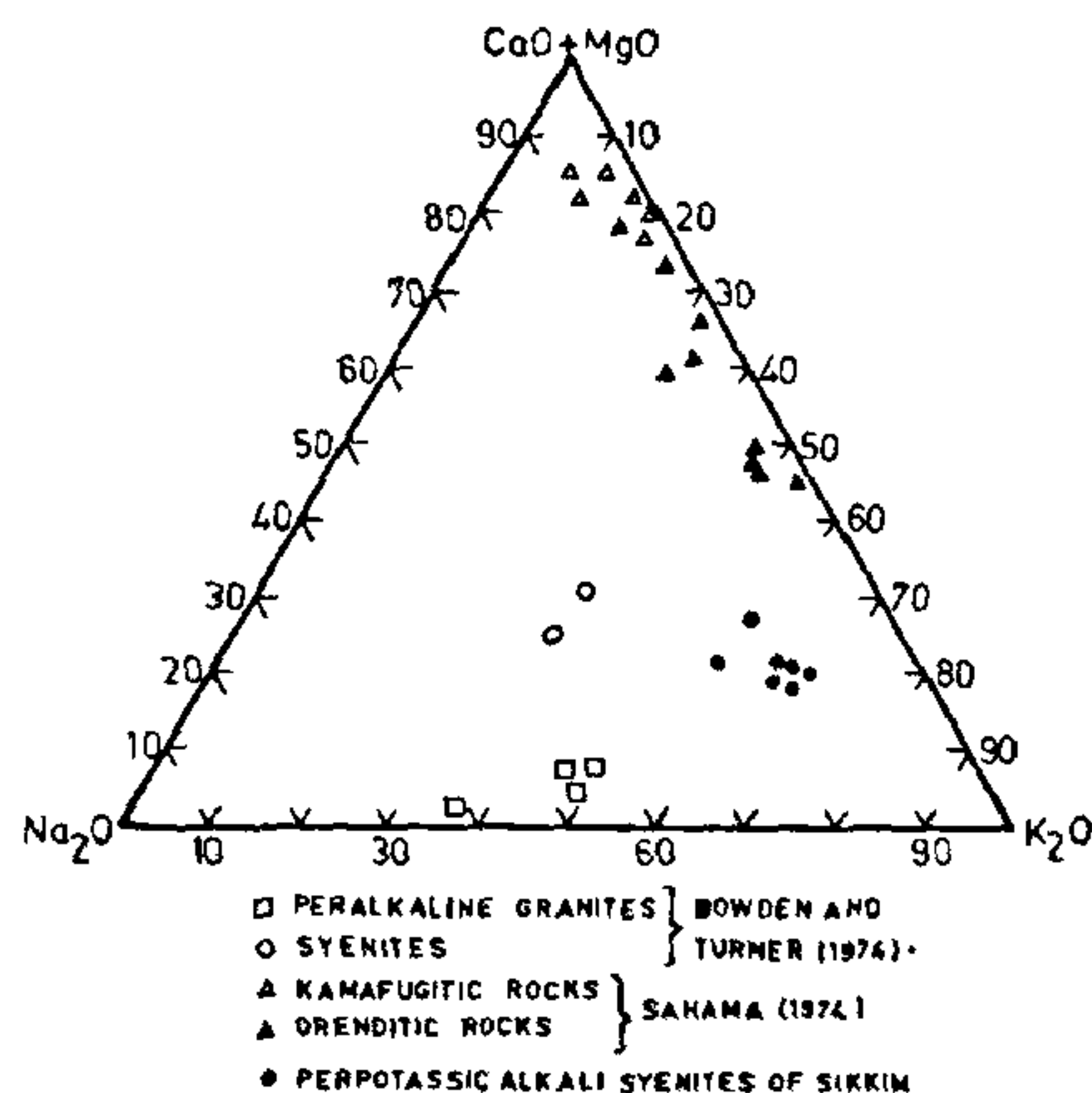


Figure 1. Na₂O-K₂O-(CaO + MgO) trilinear diagram showing plots of different types of alkaline rocks.

The mineralogical and chemical data presented above demonstrate that the Sikkim syenite is a saturated peralkaline perpotassic plutonite, which, as far as the authors are aware and as has been pointed out by Sahama⁵, has not been reported so far.

Radioactive Mineralization: The syenites have anomalously high concentrations of Th (0.01 to 0.04% ThO₂) and U (0.003 to 0.01% U₃O₈) and some significant uranium anomalies (of the order of 0.03 to 0.5% U₃O₈) have been recorded in phyllites and chlorite veins traversing quartzites of the Dalings, in the vicinity of these syenite bodies. The minerals responsible for radioactivity in these anomalous zones are uraninite, davidite, leucoxene and cyrtolite. The presence of such radioactive zones in the country rocks close to the syenite bodies which themselves contain anomal-

ous concentrations of U and Th is suggestive of a possible genetic link between the syenitic magma and the mineralizing hydrotherms. This, however, needs further study.

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***TRICHODERMA PSEUDOKONINGII* RIFAI AGGR: A NEW RECORD FOR INDIA**

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DURING a survey of moulds on cattle feed in Nainital, a species of *Trichoderma* viz., *T. pseudokoningii* was isolated from bran. A perusal of lists of fungi identified so far, including Bilgrami *et al.*¹, revealed that this is the first report of the species from India.

Colonies on Potato dextrose agar and Czapek's solution agar white at first, becoming light green in 4-5 days. Vegetative hyphae septate and hyaline. Conidiophores arise as branches of aerial mycelium; phialides nine-pin-shaped (narrow at the base and more so above); arise singly and laterally; 5-13.5 μm long and 1.4-3 μm wide in the centre. Conidia thin-walled, smooth, hyaline, oval to slightly globose; 2.8-5.5 \times 2.1 μm in size.

The culture has been deposited in the Herbarium at CMI, Kew, England (IMI No. 224797).

The author is thankful to Professor B. S. Mehrotra for encouragement and laboratory facilities and to the Director, CMI for confirmation of the identification.

6 April 1982; Revised 29 September 1982

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***RICCIA CURTISII* (AUST.) JAMES. FROM KUMAON HIMALAYAS**

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THE hepaticae of Kumaon Hills is known through the collections of various workers from time to time¹⁻⁶. However, an interesting species of *Riccia*, *R. curtisii* has never been collected from any part of the Kumaon Hills. A few thalli of this species were once collected by the side of a lake in Mohanlalganj (Lucknow) and reported for the first time from India by Pande and Ahmad⁷. They had noted that some spores of this plant were perhaps brought to the site of its occurrence from somewhere in the hills but somehow the species could not get stabilized in the plains. Curiously enough the plant has not been gathered so far from any other part of the country⁸.

During a plant collection trip to Chaurgalia (foothills) on Haldwani-Tanakpur road at an elevation of

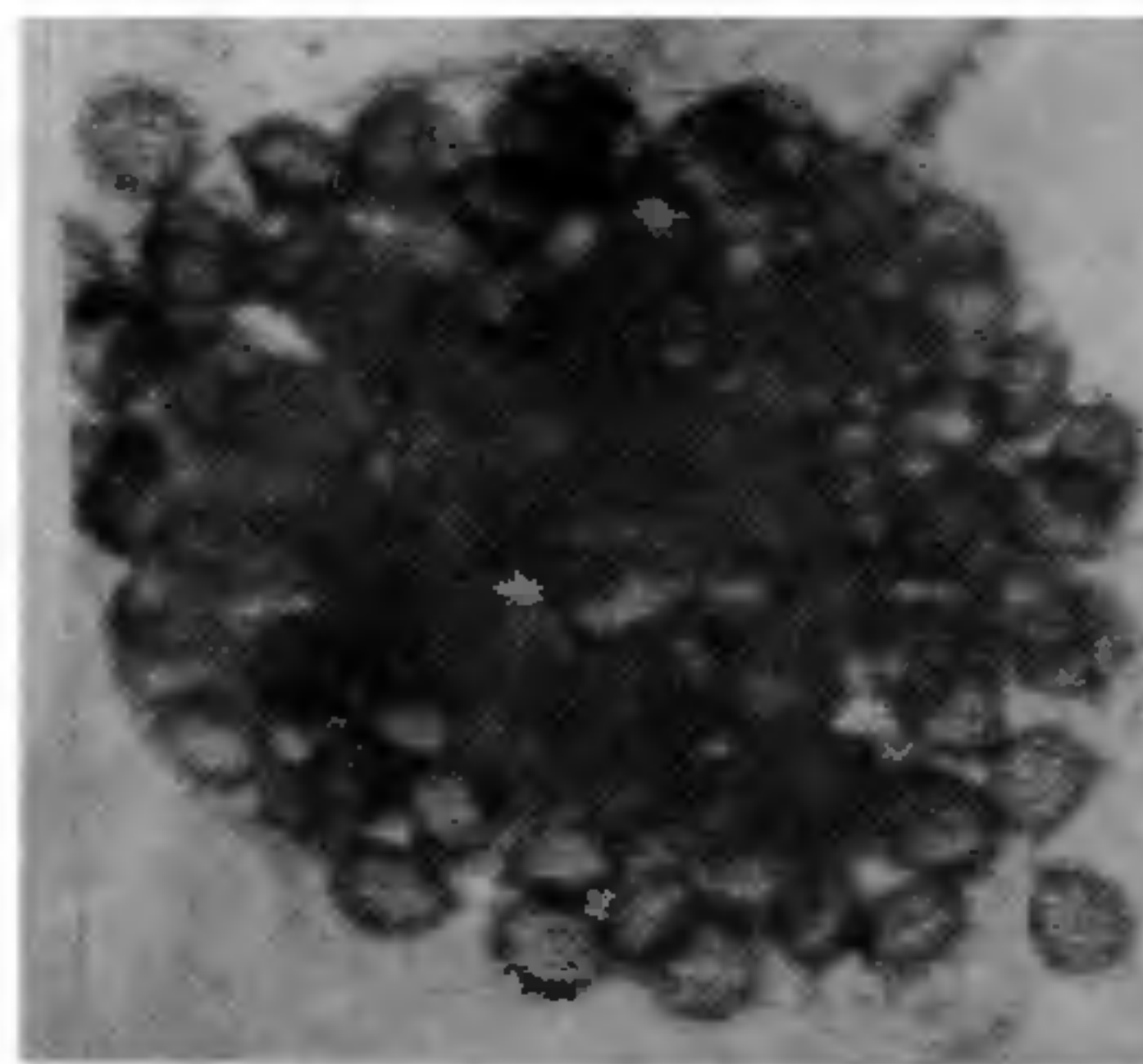


Figure 1. Longitudinal section of thallus showing nearly mature sporogonium. Also seen in the photograph is the neck of old archegonium. $\times 235$.