πεδίου», «Χαμαντᾶ Ἐλ Χόμρα», ἐκ τῶν πλέον ξηρῶν Τανεζρούφτ τῆς Σαχάρας. Χωρὶς νὰ ἀποκλείεται ἡ ἀνάμιξις τοῦ ἐξ Ἀφρικῆς κονιορτοῦ μὲ τοπικὸν κατὰ τὴν πτῶσιν τῶν λασποβροχῶν τῆς 15, 22 Μαρτ.62, δεχόμεθα, ὅτι καὶ ἂν τοιοῦτόν τι συνέβη, ἡ ἀλλοίωσις τῆς συνθέσεώς του δὲν θὰ ἦτο αἰσθητή, α) διότι ἡ δειγματοληψία ἐγένετο ἐκ καθαρῶν ἐπιφανειῶν, β) διότι ἡ ἀνὰ m^2 ποσότης κόνεως ἦτο σημαντικὴ κατὰ τὴν λασποβροχὴν τῆς 15.3.62 καὶ γ) διότι κατὰ τὴν 22 Μαρτ. 62, τοὐλάχιστον, δὲν ἔπνεεν ἄνεμος πλησίον τοῦ ἐδάφους.

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ΓΕΩΛΟΓΙΑ. — **On cretan flysch and its igneous rocks***, *by* ***G. J. Boekschoten*****. Ἀνεκοινώθη ὑπὸ τοῦ Ἀκαδημαϊκοῦ κ. Μαξίμου Κ. Μητσοπούλου[1].

Ultrabasic intrusions are not rare in the older rocks of Crete. Some of the more important occurrences are indicated on the Geological Map of Greece. Actually, their number is large and detailed mapping of some flysch regions would result in a map mottled with outcrops of basic igneous rocks. Though there certainly are ophiolites of different age on Crete, a large part was intruded in the geosynclinal sediments of Cretaceous and Paleogene age. Some of these show pillow-lava structure, similar to the ultrabasic rocks on Cyprus described

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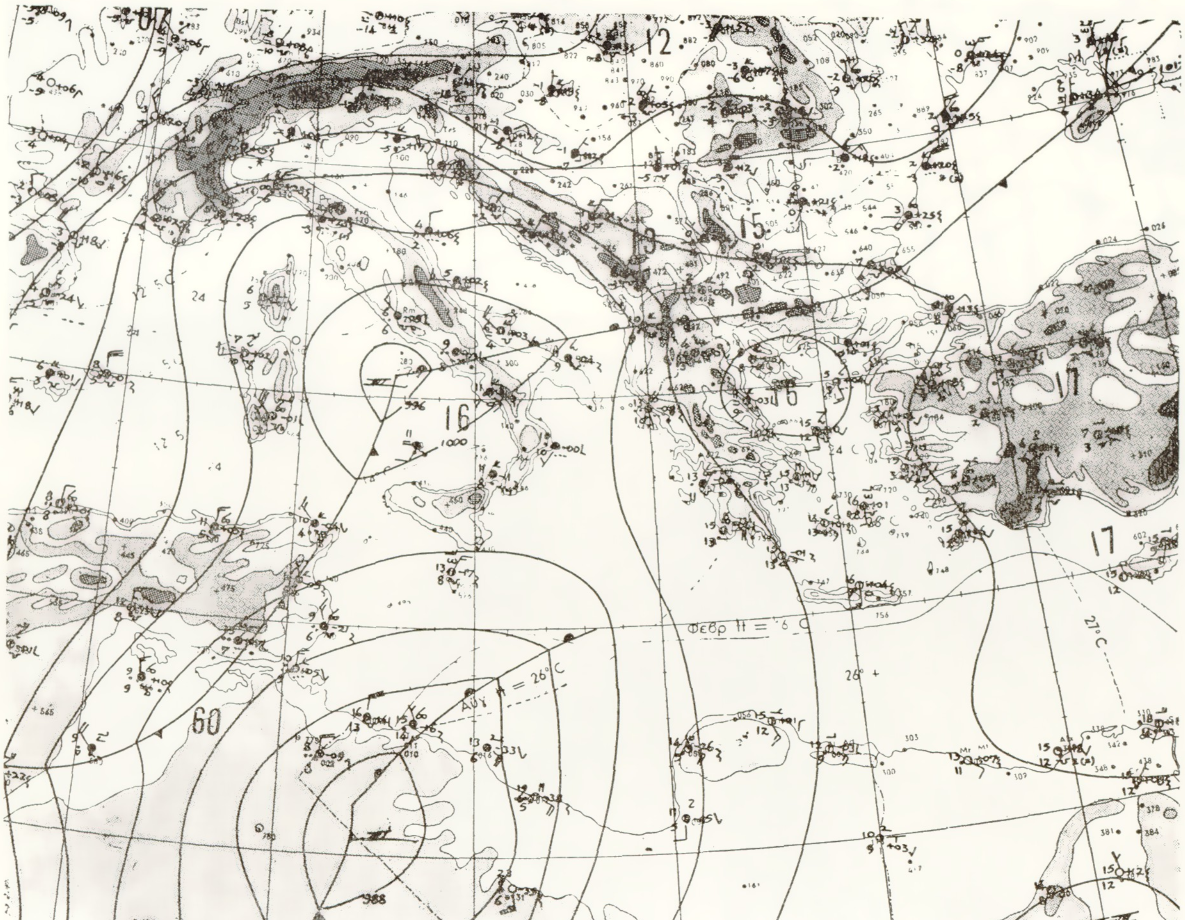
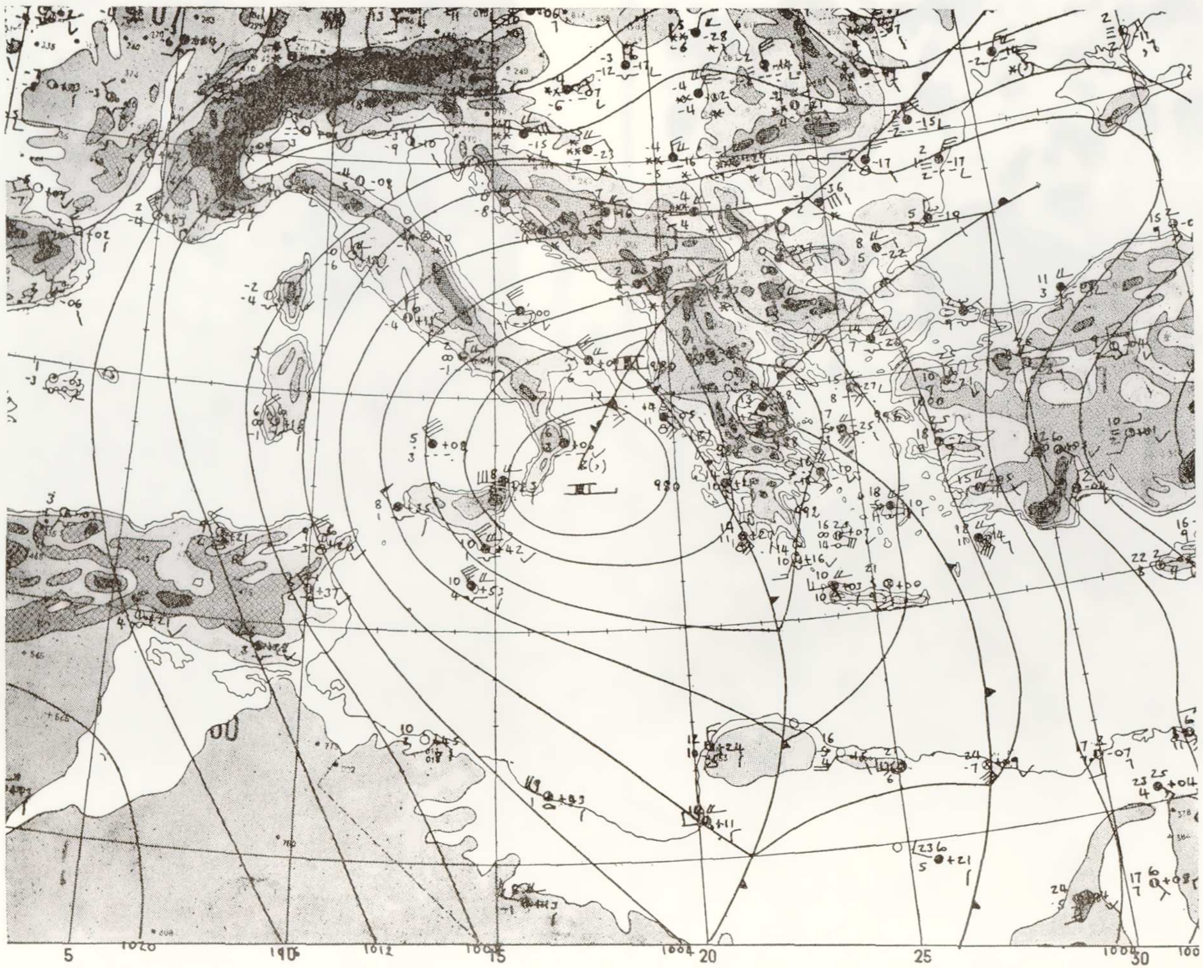
** G. J. Boekschoten, Ὁ φλύσχης τῆς Κρήτης καὶ τὰ ἐντὸς αὐτοῦ ἐκρηξιγενῆ πετρώματα.

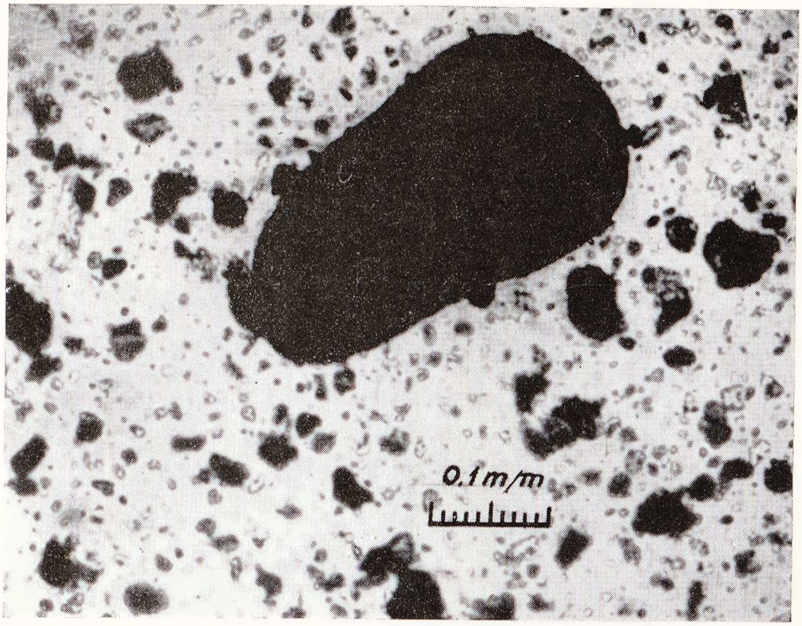
1. Ἀνεκοινώθη κατὰ τὴν συνεδρίαν τῆς 25 Ἀπριλίου 1963 (βλ. ἀν., σ. 241).

Λ. Καραπιπερη. - Αθ. Ταταρη. — ΛΑΣΠΟΒΡΟΧΑΙ ΚΑΤΑ ΤΗΝ 15 ΚΑΙ 22 ΜΑΡΤΙΟΥ 1962 ΕΝ ΕΛΛΑΔΙ

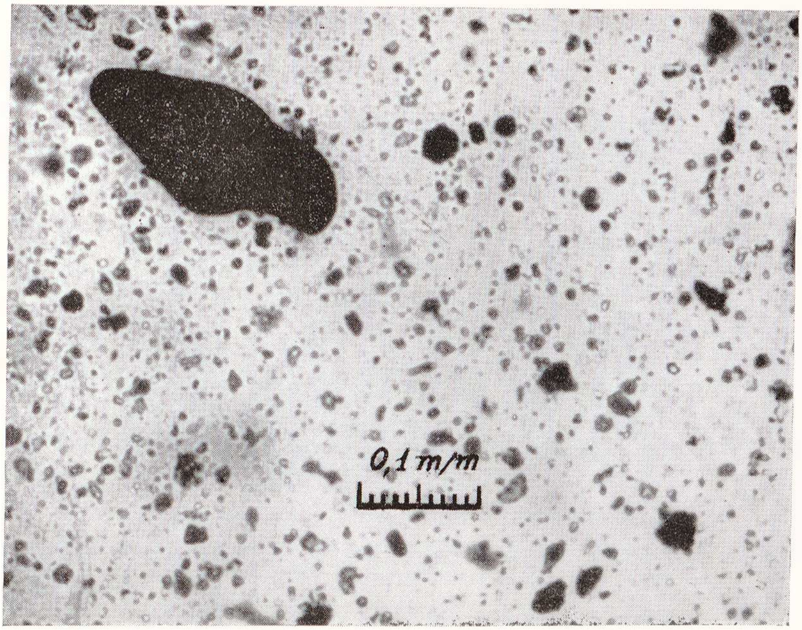


Λ Καραπιπερη - Αθ. Ταταρη. — ΛΑΣΠΟΒΡΟΧΑΙ ΚΑΤΑ ΤΗΝ 15 ΚΑΙ 22 ΜΑΡΤΙΟΥ 1962 ΕΝ ΕΛΛΑΔΙ

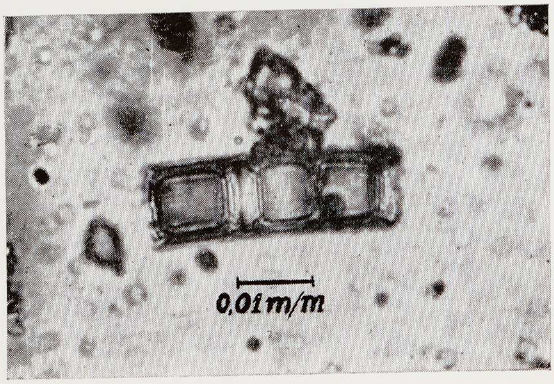




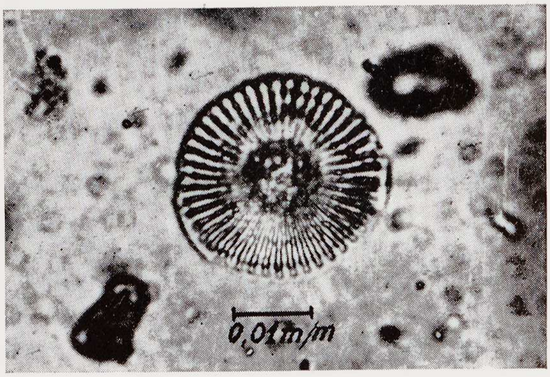
Εἰκ. 1. Μικροφωτογραφία κόνεως ἐκ τῆς λασποβροχῆς τῆς 15 Μαρτ. 1962 (Καλλιθέα).
Ὁ μεγάλος κρύσταλλος, βιοτίτης.



Εἰκ. 2 Μικροφωτογραφία κόνεως ἐκ τῆς λασποβροχῆς τῆς 22 Μαρτ. 1962 (Ἀθῆναι).
Ὁ μεγάλος κρύσταλλος, βιοτίτης

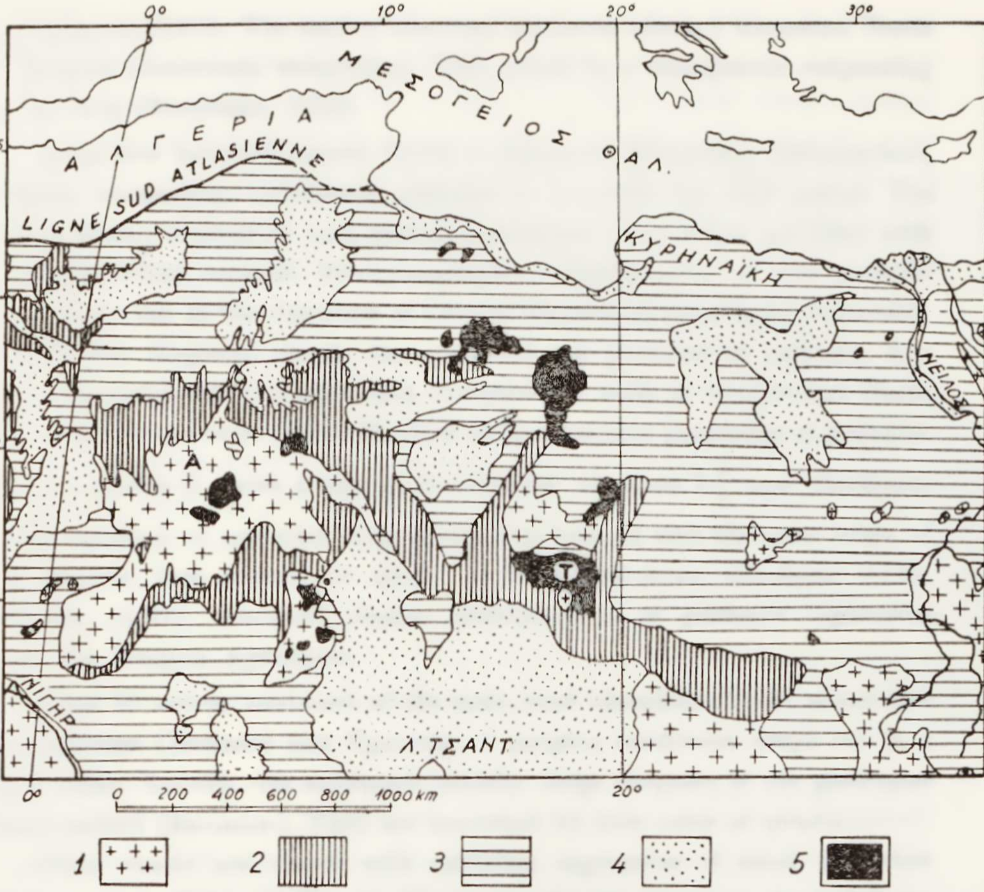


Εἰκ. 3



Εἰκ. 4

Εἰκ. 3 καὶ 4. Διάτομα ἐκ τῶν κόνεων τῶν λασποβροχῶν τῆς 15 Μαρτ. καὶ 22 Μαρτ. 1962.



Σχεδ. 5.—*Σχεδιάγραμμα τῆς γεωλογικῆς δομῆς τῆς Σαχάρας κατὰ N. Menchikoff (3). (Ἐσχεδιάσθη τμῆμα αὐτῆς).*

1. Προκαμβρικὸν ὑπόβαθρον α) ἐκ μεταμορφωμένων καὶ ἡμιμεταμορφωμένων πετρωμάτων: γνεύσιοι, ἀμφιβολῖται, χαλαζῖται, σιπολῖναι, μειγματῖται, κροκαλοπαγῆ, φυλλῖται, κρυσταλλικοὶ ἀσβεστόλιθοι, καὶ β) ἐκρηξιγενῶν: γρανῖται, ρυόλιθοι, ἀνδεσῖται.

2. Παλαιοζωϊκὰ πεδία α) ἐκ θαλασσίων ἱζημάτων: ἀσβεστόλιθοι, δολομῖται, ἀργιλλικοὶ σχιστόλιθοι, ψαμμῖται· β) ἐξ ἠπειρωτικῶν σχηματισμῶν: ἐρυθροὶ ψαμμῖται καὶ κροκαλοπαγῆ καὶ γ) ἐξ ἐκρηξιγενῶν πετρωμάτων: δολερῖται.

3. Μεσοζωϊκὸν καὶ Τριτογενὲς κάλυμμα ἐκ θαλασσίων ἱζημάτων, ἠπειρωτικῶν σχηματισμῶν καὶ λαβῶν.

4. Τεταρτογενεῖς σχηματισμοὶ θαλάσσιοι (ἀναβαθμίδες εἰς τὰ παράλια) καὶ κυρίως ἠπειρωτικοί: ποτάμιοι (ἀναβαθμίδες), λιμνῶν γλυκέος καὶ ἁλμυροῦ ὕδατος, θῖνες κ.λ. Λάβαι βασαλτικαὶ καὶ ὄξινοι.

Α. Ὀρεινὸν συγκρότημα τοῦ Ἀχαγκάρ μὲ μέγιστον ὑψόμετρον 3000 m.

Τ. Ὀρεινὸν συγκρότημα τοῦ Τιμπέστι μὲ μέγιστον ὑψόμετρον 3360 m.

by Kattamis (1962). The author observed instances about 1 kilometre North of Miamou (Asterousia mountains). This points to a subaqueous outpouring of the lava (Rittmann, 1958).

Some four hundred metres North of Epanosifi Monastery (Metaxochori, Iraklion nomarchia) weathered ophiolite is quarried for road metal. The reddish-brown crystalline rock contains countless veins which are filled with a greenish-white mineral. Röntgenographic identification of this material was carried out at the Institute of Crystal Physics at Groningen University. The powder diagrams clearly demonstrated the presence of prehnite. The opaque greenish-white crusts which overgrow the walls of cavities and cracks in the basic eruptive of Epanosifi, show all macroscopic properties of prehnite. Figure 1 (Table I) shows a vein of the mineral of about $2\frac{1}{2}$ cms thickness. The occurrence of prehnite at Epanosifi is in keeping with the usual origin of this mineral that tends to occur in weathered-down ultrabasic rocks. Pellizzer (1961) described similar prehnitisation of gabbroid ophiolites from the Emilian Apennines.

Some 50 metres westward of the main road Choudetzi-Tefeli, about half way between Choudetzi and Epanosifi, a neogene sandstone crops out in a small valley. Locally, the sediments contain large numbers of the gastropod *Brotia escheri* (Brongn.). They are traversed by thin veins of quartz.

Other cracks are coated with radiating aggregates of small colourless barite crystals (Table II, Fig. 2). The barite identification was checked at the Rijksmuseum van Mineralogie at Leiden, Holland, by courtesy of Dr. P.C. Zwaan. Owing to the small quantity of mineral present, the occurrence cannot have any economic importance. It seems probably that the Ba^{+2}-ions originate from the nearby ophiolite bodies. These certainly were subject to decomposition already in early Neogene time. The barium could be fixed by the presence of $(SO_4)^{-2}$ -ions in the brackish environment in which the sandstones were laid down.

The interpretation of the original state of the slaty deposits which surround the ophiolites is rendered difficult by tectonisation and metamorphism. Where these strata remained more or less unaltered, typical flysch features can be observed. Bonarelli (1901) already described some Chondrites which were found between Sphaka and Lastros (Lassithi nomarchia). He identified his specimens as « Chondrites prodromus Heer » and «Chondrites sirinus de L ». This find proved that the strate from which they were obtained were much younger than prepaleozoic, as had been surmised before Raulin. Indeed organic remains are very rare in the Cretan flysch. Samples which were taken by the author at Haghii Deka, at Vianos, near Skourvoula were devoid of microfauna. Mr. R.R. van der Ploeg, my assistant on Crete, found grey micaceous silty flysch slates near Skourvoula (Iraklion nomarchia). Figure 3 (Table I) shows the Chondrites preserved therein as black regularly ramifying tunnel structures filled out with claysize material.

Near Almiri (Haghii Deka, Iraklion nomarchia) the author found sandtone layers intercalated in the slates of the flysch formation with groove casts on their lower surface. Graded bedding also was present.

The properties listed before are usual in flysch. Flysch currently is understood as a thick formation of mainly clastic material, laid down subaqueous in a geosyncline anterior to paroxysmal folding. Kuenen and Migliorini (1950) suggested that turbidity currents play an important role in the sedimentation of these strata. Much confirmatory evidence has since been obtained. The presence of graded bedding and sole marking in Cretan flysch sandstone layers indicates that these are probably turbidites also.

In his fundamental study on the geology of the Pindus, Aubouin (1959) explained the way in which the several flysch zones were laid down. The Cretaceous «calcaires microbréchiques» were found to be due to the action of turbidity currents. Upper Cretaceous fossiliferous limestones were discovered in the Asterousia mountains by C. Renz (1947). Such sediments are well exposed on the southern slope of the Messara valley, near the village of Pyrgos. The light grey rocks contain countless angular fragments of limestone, orbitoids and fragments of rudists in a calcareous matrix. Tectonic complications preclude a stratigraphical interpretation but the facies is identic to Aubouin's «calcaires microbréchiques». On Crete, the flysch formation includes limestones with typical Eocene foraminiferal faunae. The same holds true for Karpathos. Here according to the descriptions by de Stefani (1895) and Christodoulou (1960), the folded preneogene sediments contain gypsum and lignite beds. The latter author classified these strata within the flysch formation. It is a matter of definition whether this term can be applied, or that molasse would be a better denomination.

It seems not impossible that the geosynclinal basin in which Crete and Karpathos were situated during the Eocene, was filled up towards the end

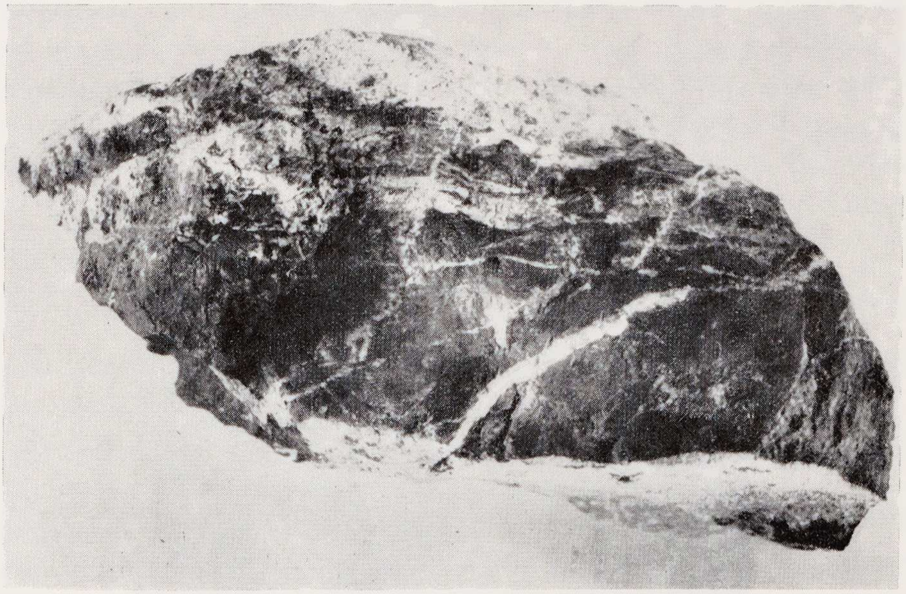


Fig. 1.—Prehnite in ophiolite (3/4×) Epanosifi.

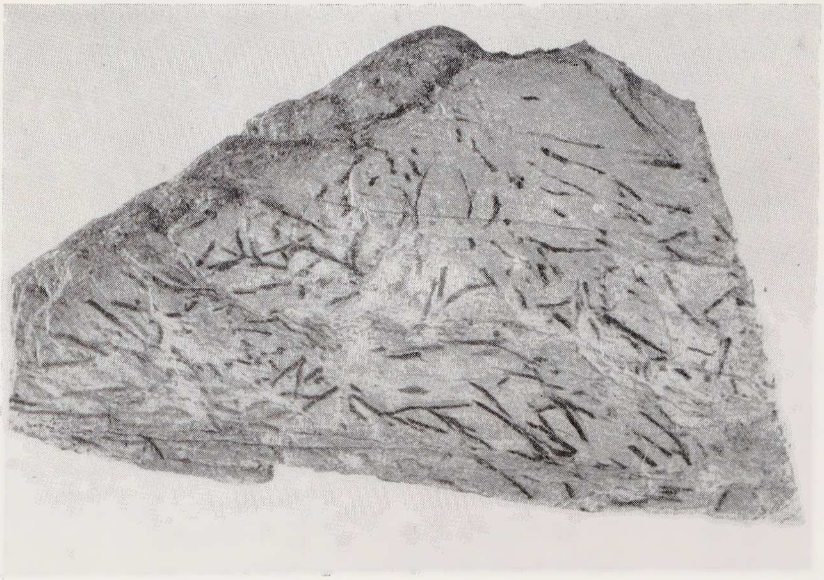


Fig. 3.—Chondrites (2/3×) Skourvoula.

Fig. 2.— Baryte (7×) Choudetzi.

of that period. The Oligocene and Lower Miocene could have developed as locally lignitic and gypsiferous continental strata. In this way the absence of Oligocene and Lower Miocene marine geosynclinal sediments on Crete and Karpathos would be understandable. In Western Greece the lack of sufficient sedimentation and also perhaps more active subsidence of the geosynclines would be responsible for the presence of Mid-Tertiary marine flysch-formations. Further research on the occurrences of lignite and gypsum on Karpathos would be most rewarding.

ΠΕΡΙΛΗΨΙΣ

Ὁ Ἀκαδημαϊκὸς κ. **Μαξ. Κ. Μητσόπουλος**, κατὰ τὴν ἀνακοίνωσιν τῆς ὡς ἄνω μελέτης εἶπε τὰ ἑξῆς.

Εἰς τὴν παρουσιαζομένην ἐργασίαν ὁ συγγρ. ὑποστηρίζει, ὅτι ὁ φλύσχης εἰς τὴν Κρήτην ἀπετέθη ἐν μέρει εἰς γεωσύγκλινα ἐντὸς τῶν ὁποίων ἐκυκλοφόρουν θαλάσσια ρεύματα περιέχοντα ἄφθονα ἐν αἰωρήσει στερεὰ ὑλικά. Ὀλιγοκαινικὸς καὶ μειοκαινικὸς θαλάσσιος φλύσχης δὲν ἀπαντᾷ εἰς τὰς νήσους τοῦ νοτίου Αἰγαίου. Ὁ συγγρ. ὑποθέτει, ὅτι κοιτάσματα γύψου καὶ λιγνίτου ἐσχηματίσθησαν κατὰ τοὺς χρόνους ἐκείνους εἰς τὴν Κάρπαθον.

Εἰς τὴν Κρήτην ὁ φλύσχης περικλείει ὀφιολιθικὰ πετρώματα, ἅτινα ἐν μέρει ἐξεχύθησαν ὑποθαλασσίως. Συνεπείᾳ μεταγενεστέρας ἀποσαθρώσεως ἐσχηματίσθησαν φλέβες πρενίτου. Τέλος δέχεται ὁ συγγρ. ὅτι μετὰ τῆς ἀποσαθρώσεως ταύτης δυνατὸν νὰ συνδέεται ἡ παρουσία βαρύτου ἐντὸς τῶν νεογενῶν σχηματισμῶν παρὰ τὸ χωρίον Χουδέτσι.

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