the fibrous soil mineral but there are differences in detail. The lamellar soil mineral seems very similar to the layer-lattice silicate found to be a constituent of iddingsite (Brown and Stephen, 1959), but differs in that the soil mineral can be readily expanded by glycerol.

It is likely that the fibrous mineral and the lamellar mineral owe their crystallographic order to the inheritance of undisplaced structural units from their parent minerals and that the study of such pseudomorphs will give structural information about clay minerals that could not be obtained from X-ray powder photographs or electron diffraction.

Pedology Department, G. BROWN
Rothamsted Experimental Station, I. STEPHEN
Harpenden.

BLYTH (F. G. H.), 1944. Quart. Journ. Geol. Soc. London, vol. 99 (for 1943), p. 187.
BROWN (G.) and STEPHEN (I.), 1959. Amer. Min., vol. 44, p. 251.
CAILLIÈRE (S.) and HÉNIN (S.), 1951. Clay Min. Bull., vol. 1, p. 138.

BOOK REVIEWS

HAWKES (H. E.). *Principles of geochemical prospecting.* Bull. U.S. Geol. Survey, 1957, no. 1000-F, pp. 225–355. Price 40 *c.*

Geochemical prospecting for minerals includes any method of mineral exploration based on systematic measurement of the chemical properties of a naturally occurring material. The purpose of the measurements is the location of geochemical anomalies or of areas where the chemical pattern indicates the presence of ore in the vicinity. Anomalies may be formed either at depth by igneous and metamorphic processes or at the earth's surface by agents of weathering, erosion, and surficial transportation.

Geochemical anomalies of deep-seated origin—primary anomalies—may result from (1) apparent local variation in the original composition of the earth's crust, defining a distinctive 'geochemical province' especially favourable for the occurrence of ore, (2) impregnation of rocks by mineralizing fluids related to ore formation, and (3) dispersion of volatile elements transported in gaseous form.

Anomalies of surficial origin—secondary anomalies—take the form either of residual materials from weathering of rocks and ores in place or of material dispersed from the ore deposit by gravity, moving water, or glacial ice. The mobility of an element, or tendency for it to migrate in the surficial environment, determines the characteristics of the geochemical anomalies it can form. Water is the principal transporting agency for the products of weathering. Mobility is, therefore, closely related to the tendency of an element to be stable in water-soluble form. The chemical factors affecting the mobility of elements include hydrogen-ion concentration, solubility of salts, coprecipitation, sorption, oxidation potential, and the formation of complexes and colloidal solutions. The mobility of the elements may be further modified by biological factors.

Secondary anomalies may occur in residual materials or in materials transported by ice, frost, underground water, animals, soil-forming processes, plant activity, and surface water. Each one of these transporting agencies gives a characteristic distribution pattern to the weathering products of ore deposits.

Geochemical methods have been applied most extensively in the Soviet Union, Scandinavia, the United States, Canada, Africa, and Japan. The most uniformly successful geochemical prospecting work has been based on sampling and analysis of residual soil and vegetation; anomalies caused by movement of metals in ground and surface water show promise as an effective means of locating buried ore deposits. Some suggestions for the execution of geochemical surveys and the interpretation of geochemical data in terms of possible ore are presented.

KERR (Paul F.). *Optical Mineralogy.* London (McGraw-Hill Book Co., Inc.), 3rd edn, xiv+442 pp. Price 66*s.*

Part I (Optics) is the same length as in the 2nd edition and the chapter headings have been retained, but the text has been largely rewritten. Among microscopes the Zeiss Standard is described, but the new large Leitz models are not represented. A new chapter has been inserted, on the Universal stage (13 pp.). Conoscopic procedure and the three-axis stages are not mentioned. The four-axis stage is described with an Emmons notation, but the five-axis stage is shown with a notation which uses the well-known Berek symbols in reversed order (see Emmons, Amer. Min., 1929, **14**, 441). Since this method was expressly discarded by Emmons (Geol. Soc. Amer., 1943, 8, 13) as 're-numbering the axes, leading to tragic confusion' its revival is unfortunate; the Berek, Reinhard, and Emmons notations are established and may well suffice. A few details may need correction: p. 5; epoxy resins (A. G. King, Amer. Min., **42**, 689, 1957) are important for impreg-