fels, volcanic rock, sandstone, granite, and fragmentary belemnites and buchias.

All fossil collections were studied by G. D. Hanna and Leo Hertlein. Middle Cretaceous fossils reported as *Lytoceras* sp., *Phylloceras* sp., and *Prionotropis* sp. were collected from the sea cliffs at the mouth of the Douglas River. Sea-cliff exposures a short distance west of the southernmost mouth of the Douglas yielded *Phylloceras* sp. Though assigned to undifferentiated Cretaceous, the latter beds are believed to be stratigraphically close to the base of the Cretaceous of the Kamishak Bay area; better collections might establish the presence of Lower Cretaceous. Collections made high in the Kamishak Hills about 7 miles southeast of the mouth of the Kamishak River include the following Upper Cretaceous genera: *Parapachydiscus, Phylloceras, Turrilites,* and *Inoceramus.*

Stratigraphic relations are uncertain between the Cretaceous at Kamishak Bay and the Lower (Albian) Cretaceous at Kaguyak, 30–35 miles south. At Kaguyak, Lower (Albian) Cretaceous fossils were collected a few hundred feet above the top of the Upper Jurassic Naknek formation.

Lower Cretaceous Rocks at Cape Kaguyak North of Kukak Bay, Alaska

John C. Hazzard

Union Oil Company of California, Los Angeles

Beds of Lower Cretaceous (Albian) age occur at Cape Kaguyak on the western side of Shelikof Strait about 17 miles north of Kukak Bay. Cape Kaguyak is a flat-topped promontory separated from the main coast to the west by a half-mile wide swampy sand flat. About 400 feet of beds comprising fossiliferous, concretionary, black limy siltstone with thin beds of dark bluish-gray limestone are exposed in the seacliffs on the cape and in the surrounding reefs. The presumed base of the Cretaceous is a 30-foot greenish-gray, fine-grained sandstone cropping out at the mainland edge of the sandflat west of the cape. The nature of the intervening section is unknown. The basal sandstone rests with apparent conformity on the Upper Jurassic Naknek formation. North of Cape Kaguyak along the coast west of Swikshak Lagoon a thick section of bedded rocks is exposed. Regional relations indicate that this section includes the Naknek formation at its base, overlain by beds correlative with those at Cape Kaguyak, and the section may extend upward into the Tertiary. Atwood reported Cretaceous rocks in this vicinity (*1*, Pl. VI).

S. W. Muller reports the following Lower Cretaceous (Albian) forms from Cape Kaguyak: *Cleoniceras* sp., *Hamites* several species, *Beudanticeras* sp., *Phylloceras* sp.

Correlation between the Kaguyak Cretaceous and the Middle and Upper Cretaceous in the Kamishak Bay region 30–35 miles north is uncertain. Lower Cretaceous rocks in the Alaska Peninsula are known at Herendeen Bay and Port Moller (*1*, Pl. VIII).

Reference

1. Atwood, W. W. *U. S. Geol. Survey Bull. 467,* 1911.

Measurement of Ion Migration on Paper in an Electric Field. Transference Numbers of Nickel and Copper Sulfates

Hugh J. McDonald, Matthew C. Urbin, and Martin B. Williamson

Department of Biochemistry, Stritch School of Medicine, Loyola University, Chicago

While studying the separation of various organic and inorganic compounds of biochemical interest, a method was devised which yielded good results in some cases, and appeared to be of great promise in others. As far as the authors are aware, the method described here has not been reported previously.[1] Essentially, it is based on electrophoresis, in which a strip of filter paper serves as a path along which ions or charged particles migrate under the influence of a potential gradient.

The apparatus is illustrated in Fig. 1. A strip of filter paper,[2] *P*, 35–50 cm in length, was supported in a glass tube 2.5 cm in diam by means of two glass pins, *B*, piercing the paper strip and passing into small holes in the rubber stoppers at each end of the tube. The electrode vessels, *A*, fitted with platinum-wire electrodes, were filled with 0.1 *N* KCl and connected by means of an agar saltbridge with the large buffer vessels, *D*. The ends of the paper strip were then permitted to become completely wetted with the KCl solution by wick

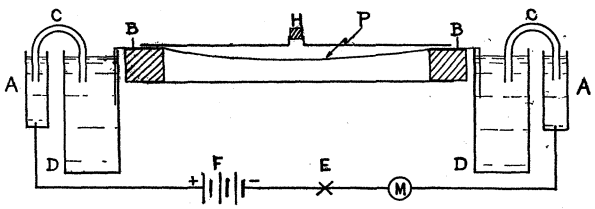

Fig. 1. Apparatus devised to study ion mobilities.

action. In certain experiments, particularly those with amino acids and proteins, solutions of electrolytes that acted as buffers were used to wet the paper strip. With the switch, *E*, closed, the circuit was completed. With a voltage of 135 v, provided by the batteries, *F*, a current of 1–3 ma was registered on the milliammeter, *M*.

Despite the superficial resemblance to paper chromatography, the method is basically electrophoretic in nature. Chromatographic processes depend on a distribution of some material between a mobile and a nonmobile phase. In the technique described, the separa-

[1] After this manuscript had been submitted for publication, an abstract by E. L. Durrum (*1*), which appears to embody some of the ideas of this paper, came to the attention of the authors.

[2] Eaton and Dikeman Paper No. 613 in rolled strip form, 8 mm wide.