ference in activity makes the colloids react differently. The hydrometer method does not show this difference in activity, but the heat of wetting does. Part of this activity or condition of the colloids, however, is apparent to the eye or touch. For instance, some colloids are not so sticky or plastic as others.

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SPECIAL ARTICLES

OCEANOGRAPHIC RECONNAISSANCE OF THE NORTHERN SECTOR OF THE LABRADOR CURRENT

The coastal waters off northern Labrador have long been neglected as a field for scientific study, being neither far enough away to warrant an elaborate arctic expedition nor yet near enough to be reached easily. With the modern development of dynamic oceanography it is now possible through subsurface measurements of temperature and salinity not only to secure an accurate picture of the extent of a gradient current, but also to understand how and why it flows. This gives an increased value to well-planned subsurface observation, although in most parts of the sea the stations must be many, and close together, for the best results. Along the Labrador Coast, however, the contrasts in temperature and salinity are so great that fewer stations will suffice to indicate the dominant, dynamic tendencies, so that this region offers a most promising field for a short cruise.

The existence of a powerful south-flowing arctic current, coming out of Davis Strait and following the coast line southward for 1,600 miles to the so-called "Tail" of the Grand Banks, has long been common knowledge. The fact that this arctic flow transports many bergs from Baffin Bay south to the shipping lanes aroused sufficient interest in England (1913, after the *Titanic* disaster) for the sending out of the *Scotia* expedition. Since 1914 the U. S. Coast Guard cutters on the Ice Patrol Service have spent much of their time studying the physical properties of the waters of the region, so that we now have a nearly complete picture of the circulation in the vicinity of the Grand Banks and as far north as the Strait of Belle isle. But north of this point subsurface observations off shore in the Labrador current proper, have been confined to two stations made by the *Scotia* at about lat. 54° 30′ N.

During the summer of 1926 an oceanographic reconnaissance of the current off the Labrador coast was carried out by eight Harvard students, under the leadership of C. Iselin. In a seventy-seven foot schooner, named the *Chance,* the expedition sailed as far north as Cape Chidley, the northeastern extremity of the peninsula. Forty-five stations were occupied for serial observations, at many of which plankton hauls were also made.

It is impossible here to give more than a brief survey of the more important results of the expedition, which are still being worked up at the Museum of Comparative Zoology. But two profiles of the Labrador current show the south-moving icy water considerably narrower than had previously been supposed. The current was confined to the water over the continental shelf and therefore extended off shore only eighty-five miles off Nachvak Bay (lat. 59° N.) and one hundred and twenty-five miles off Sandwich Bay (lat. 54° N.). At the outer edge of the current there was a very abrupt change from water as cold as −1.5° C. to water of 4° C. At the same time the salinity increased from less than 33.5 to about 34.5 per thousand. This region of transition was so sudden that the isotherms and isohalines are nearly vertical when plotted to the usual scale on cross-section paper. The *Chance* data, compared with the *Scotia* stations, shows that outside the edge of the continental shelf the water of this sector is remarkably homogeneous, and as far as is yet known has little dynamic cause for movement. The inshore water, though very cold, is much less saline and therefore lighter than the offshore water, a contrast great enough to cause a gradient current of about twelve miles a day to the southward along the whole length of Labrador. That this current is comparatively constant in character and volume all the way from Davis Strait to Newfoundland is proven by the available information.

Although the study of this northern sector of the Labrador current is as yet in its infancy, the following preliminary statement seems warranted. Land drainage supplies about as much fresh water to the coastal edge of the current as is lost along its outer edge through mixture with the warmer and more saline north Atlantic water. The great vertical stability of the water layers is a factor in keeping the temperature practically constant throughout the length of the current, because in summer a thin surface film of water of low salinity averaging about 3° C. in temperature prevents the penetration of solar warming by convection to the deeper water, which continues southward nearly at its winter value (−1.5° C). This same surface film is prevented from warming to any great extent during the summer, first by the field ice in the spring, and later by the melting of the bergs which it carries south. In this way a considerable volume of water with a temperature of less than 0° C. and a salinity of about 33 per thousand is transported all the way south to the Grand Banks.

Besides the oceanographic work, a collection of plants was secured from the Torngat region of northern Labrador. This comparatively high range of mountains rises from four to six thousand feet directly out of the sea and is indented by several little known and very beautiful fiords. In the course of exploring these opportunity was had to learn something of the northern limits of the Atlantic salmon, and the southern limits of the Greenland char. Lastly, the expedition was able to contribute to the intensive studies of the cod now being carried out by the U. S. Bureau of Fisheries, by bringing back a series from northern Labrador.

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EXCHANGEABLE HYDROGEN AND SOIL REACTION

BASE exchange investigations have received much attention recently, and the procedures employed have been described in detail. Ammonium chloride has come to be the most commonly used salt for displacement of the alkalies and alkaline earths, while barium chloride is preferred for the determination of exchangeable hydrogen; the latter salt has recently been recommended for the displacement of all bases.

So far as the writer is aware, ammonium acetate has not been mentioned as a base exchange salt, but it seems to have some important advantages, which will be discussed.

It is a "neutral" salt, the ionization constants of ammonia and acetic acid being nearly the same, about 1.8×10^{-5} at 25°; both acid and base are very weak, hence the salt is a good buffer around the neutral point. The use of a neutral buffer solution for leaching the exchangeable bases from the soil appears to be the logical procedure. Without doubt exchangeable hydrogen obtained in the extracts is closely correlated with pH of the solution in contact with the soil, hence the amount of ammonia absorbed and the total absorbent capacity of the soil will depend upon the same factor. For this reason it would seem advisable to use a solution at some definite reaction in all cases. If such solution is neutral, the solvent effect upon soil minerals should be less than if it was acid. Ammonium acetate is completely volatile on the steam bath and is easily gotten rid of by simple evaporation without danger of loss, and without the use of nitric acid as required for the destruction of ammonium chloride. A normal solution of ammonium acetate at pH 7.0 is a good solvent for all the bases which may be expected to be concerned in soil work, including iron and aluminum, considerable quantities of which remain in the hydrosol condition in such a solution at ordinary temperatures. It will not dissolve these hydrated oxides from the soil, however, as ammonium citrate does, hence if they are found there is a strong presumption that they have entered the solution by true interchange; the buffer properties of the salt make it seem unlikely that the amounts of free acetic acid resulting from exchanged hydrogen would raise the H-ion concentration sufficiently to dissolve an appreciable amount of these elements, but which might very easily happen with ammonium chloride. A normal solution of ammonium acetate at pH 7 does not attack calcium carbonate to as great an extent as ammonium chloride does, although the solvent effect is not negligible. More organic matter is dissolved by the acetate than by the chloride, although the writer has never encountered any soil giving more than a straw-colored extract, nor had any difficulty from this source. Ammonium acetate is readily soluble in alcohol, permitting the use of this solvent for the removal of the excess salt from the leached soil, for the subsequent determination of the absorbed ammonia. Alcohol is better than water for the purpose, as it runs through faster, and there is no tendency for the ammonium absorption complex to break up in alcohol, as usually happens when washed with water.

Unfortunately, ammonium acetate is not obtainable in pure neutral crystals; the commercial salt is rather indefinite in composition, but always contains excess acid. A normal solution of the neutral salt is therefore best prepared by mixing equal volumes of carefully prepared twice normal acetic acid and ammonia, checking the reaction by means of the quinhydrone electrode and adding sufficient acid or ammonia to bring to exact neutrality and water to compensate for the contraction in volume occurring on mixing these strong solutions.

One hundred gram portions of soil crushed to pass 2 mm are percolated with 750 cc of the solution; according to the writer's experience, this volume is sufficient to remove the exchangeable bases from the silt loam soils so far investigated. The percolation is conducted in an apparatus so arranged that the solution is protected from the atmosphere, a point of importance if exchanged hydrogen is to be determined. This determination presents some difficulty, in consequence of the buffer properties of the salt. By a procedure of electrometric titration, however, excellent results have been obtained. The entire percolate is poured into an 800 cc Pyrex beaker, 0.5 g. quinhydrone added, and a comparison electrode