Technical Papers

Pollen and Radiocarbon Studies of Aleutian Soil Profiles[1]

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Recent studies of soil profiles have provided samples for pollen analysis and radiocarbon dating which will contribute toward a chronology of postglacial events in the Aleutians. The investigations should provide data of correlative value for geology, biology, and anthropology.

Nonarchaeological profiles show alternating layers of humus and ash, with some sand and occasional lenses of a weathered till (Fig. 1). The ash layers record periodic ash eruptions of Aleutian volcanos. Sand layers are usually noticeable only close to the shore, where they may vary in thickness from less than 1 in. to 30 or 40 feet. Glacial till is not always evident, but when occurring it is near the bottom of the profile. A ferruginous band, possibly caused by leaching from above, shows up in the middle soil zone and may prove to be a dependable point of departure for correlation.

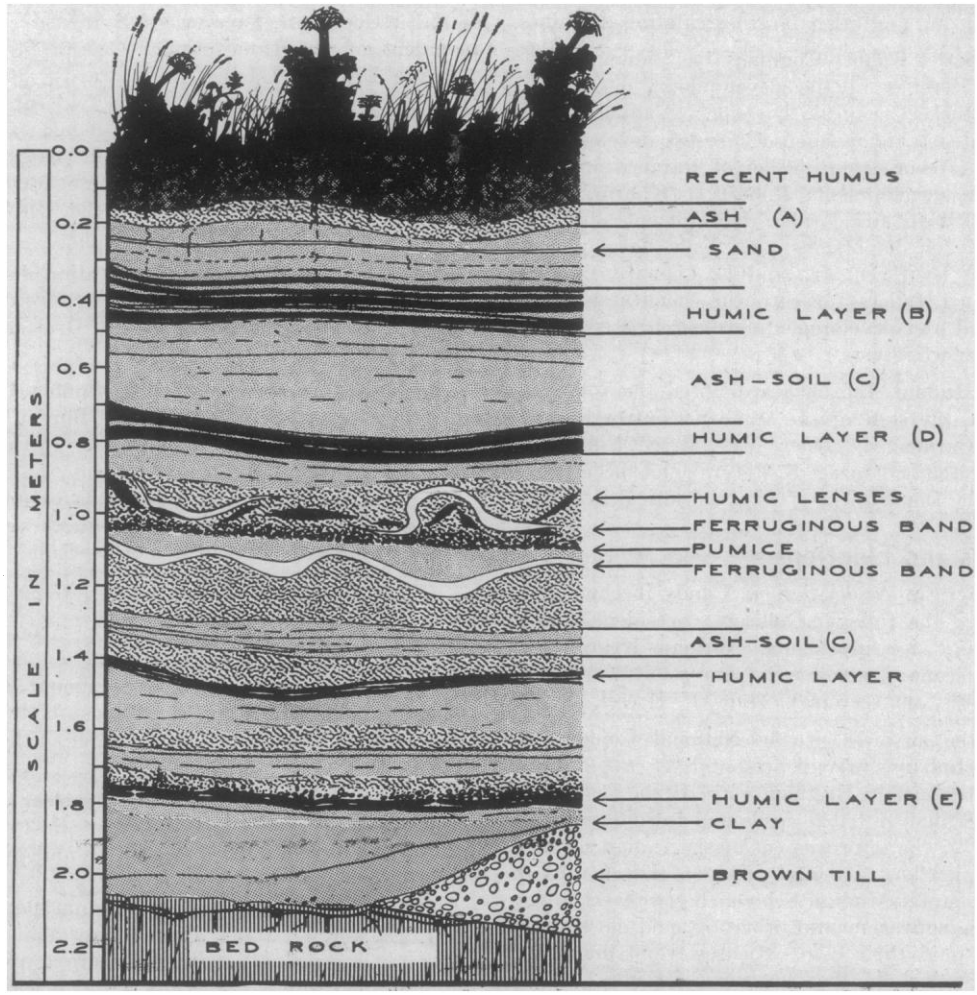

FIG. 1. Nonarchaeological soil profile of a road cut on Tanaga Island, Aleutians. The site is at 75 m elevation, today a *Calamagrostis* meadow. The recent humic layer is approximately 0.2 m thick. Ash (*A*) and other ash layers are pumiceous, sometimes coarse, and of volcanic origin. Humic layer (*B*) contains alternating layers of organic material and ash. Ash soil (*C*) is mainly a weathered silty soil with fine ash, sometimes showing banding. Humic (*D*) layer is at 0.85 m depth. From this layer came sample Tanaga-18. Humic (*E*) layer is at 1.83 m depth. Sample Tanaga-39 came from here. Immediately above it is a layer of pumice and coarse, reddish ash. The clay bed is of a yellow-brown color, sometimes reddish.

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Several hundred samples of humus, ash, till, and charcoal have been collected at varying altitudes from Kodiak, Unalaska, Umnak, Atka, Adak, Tanaga, and Agattu islands. These were taken from freshly exposed profiles of stream banks and road cuts, as well as from archaeological excavations, and were collected with a clean trowel into paper bags. Phytoecological data were also recorded at each site.

Judson (*1*) stated that he found Aleut cultural remains associated with the middle soil zone on Adak. This seems to be borne out by the studies of Bank during the examination of profiles near prehistoric villages on Amaknak and Atka.

In Aleutian archaeological sites, lensing is extremely complicated because of the numerous deposits of clamshell, fishbone, and sea-urchin shell which are seasonal accumulations, sometimes during a thousand years or more of occupation of a single site. However, since humic layers frequently separate cultural horizons in the middens, samples can be obtained for pollen analysis as well as for radiocarbon determination, and these humic strata can be used in conjunction with sometimes discernible ash bands as index layers in the chronology.

Recently published radiocarbon dates for Aleutian middens are very interesting. A date determined at Chicago of about 3020 years was obtained for the lowest cultural remains in a mound excavated by Laughlin on Umnak (*2*), and a shell heap on Adak (no collection data given) was dated at about 4600 years (*3*), indicating that human occupation in the Aleutians has covered a much longer time interval than was anticipated. Dates for Aleutian archaeological sites studied by the Michigan group will be announced soon by the University of Michigan radiocarbon laboratory.

A preliminary pollen analytical investigation of some of Bank's samples has been done by Anderson in order to ascertain whether this method would be applicable to Aleutian soils as opposed to peats and mucks. Altogether three samples were examined, two from a profile at Tanaga, central Aleutians, and one from a profile at Unalaska. Both sites were nonarchaeological. The Tanaga site is at 75 m elevation, today a *Calamagrostis langsdorfii* meadow as described by Hultén (*4*) and Bank (*5*). The Unalaska profile is on a slope at 915 m elevation, today covered by *Empetrum* heath with short grasses and scattered prostrate willows.

The samples were treated with (*a*) potassium hydroxide, (*b*) hydrofluoric acid, (*c*) Erdtman acetolysis mixture, according to the procedure described by Faegri and Iversen (*6*).

The samples are unique because all material is from terrestrial deposits, and the usual expectation would be for all pollen and spores to have been destroyed by oxidation; it was therefore a surprise to find these well preserved and present in ample quantity for statistical analysis. Preservation has probably depended upon the unusual Aleutian climate, marked by constant, high precipitation and low temperature, and constant saturation of the soil with water.

TABLE 1

RESULTS OF POLLEN ANALYSIS OF ALEUTIAN SOIL SAMPLES

	Alnus*	Betula	Populus	Juniperus	Gramineae	Cyperaceae	Ericales	Artemisia	Ranunculaceae	Caryophyllaceae	Geranium	Epilobium	Umbelliferae	Campanula	Achillea	Unidentified pollen	Lycopodium	Dryopteris	Total pollen grains and spores
Tanaga-18																			
0.85 m depth	0.3	—	—	0.3	56	23	3.7	—	9.0	—	—	—	2.2	0.8	—	0.6	0.8	3.1	356
Tanaga-39†																			
1.83 m depth	0.3	0.3	0.3	—	22	2.9	55	—	1.3	—	—	—	0.3	—	—	0.3	17	0.3	309
Unalaska-12																			
0.74 m depth	—	—	—	—	0.7	2.4	—	6.5	—	0.2	0.5	0.3	9.6	0.3	0.3	0.3	—	79	416

* Figures are percentages of the total of pollen and spores.
† From same site as Tanaga-18 but deeper, at 1.83 m below the surface.

The results of the microscopical examination are presented in Table 1. The two samples from Tanaga, one from the lower part, the other from the upper part of the profile, indicate two entirely different plant communities. The older one, with high percentages for *Ericales* and *Lycopodium*, represents the *Empetrum* heath as described by Hultén, but the younger sample indicates a vegetation very similar to the *Calamagrostis* meadow today existing at the place of the profile. The Unalaska profile is peculiar, being completely dominated by a fern, *Dryopteris* sp.

It is indicated that pollen analysis of some strata in the volcanic ash profiles is possible, and that a fuller investigation of selected undisturbed profiles may be expected to enlighten us about many features of the postglacial history of the vegetation of the Islands. Changes are indicated, which could be interpreted as caused by climatic variations. By correlation of samples from the archaeological sites and by radiocarbon dating, a picture should be obtainable of climatic and

living conditions prevailing by the time of the ancient Aleut settlements. This is one chief objective of the current Aleutian project at Michigan.

References

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The Effect of Insulin Coma on Uropepsin Excretion[1]

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Uropepsin excretion determinations were performed on 10 schizophrenic patients who underwent insulin coma therapy. No patients were included who exhibited gastrointestinal, neoplastic, or other physical diseases that might influence uropepsin excretion. Control periods of at least one week were observed before and after therapy. Comparable studies were obtained with subshock insulin and electroconvulsive treatments. For each determination, the measured urine specimen covered the period of actual therapy, was of about 4 hr duration, and corresponded diurnally to the controls. All specimens were obtained between 7:00 A.M. and 11:00 A.M. Uropepsin determinations were performed according to P. M. West's modification (*1*) of Sylvest's technique (*2*). The results have been quantified in units/hour; the reproducibility of the method is approximately 2%.

The generally irregular and fluctuating, abnormally high concentrations of uropepsin during the control periods conformed to the pattern usually found in schizophrenic psychotics (*3*). The characteristic response to the intramuscular administration of regular insulin was an increase in uropepsin output. The magnitude of this reaction did not correlate with the form of schizophrenia, the dosage of insulin, the stage of insulin treatment, the occurrence of coma, or the duration of therapy. The unit dosage at which the first significant increase in output occurred varied between 40 and 600; that for the maximum increase varied between 80 and 900. The maximal outputs were from 1.5 to 5 times the control levels (Fig. 1), might occur

[1] Reviewed in the Veterans Administration and published with the approval of the chief medical director. The statements and conclusions published by the authors are the result of their own study and do not necessarily reflect the opinions or policy of the Veterans Administration.

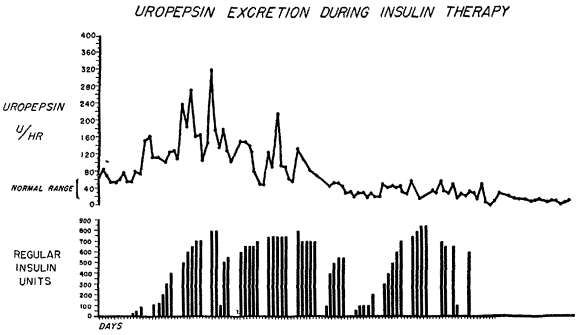

FIG. 1. Effect of regular insulin administration on the excretion of uropepsin. Coma occurred at the 21st dose (650 μ). Note that insulin dosage was deliberately reduced twice thereafter in order to evaluate the effect upon uropepsin excretion.

at any point in therapy, were not sustained, and could not be reproduced with comparable or larger doses of insulin. In those instances in which electroconvulsive therapy preceded insulin coma, and in control studies with electroconvulsive therapy alone, the increase in uropepsin excretion was smaller and evanescent during the electroconvulsive treatments and did not affect the response to insulin.

The problem of quantifying certain adrenocortical functions in schizophrenic psychotics in the resting state, and under the influence of insulin and other physical therapies, proved to be a difficult one until the discovery of what is evidently a simple and quantitative measure of this activity, namely, uropepsin (*4*).

Eosinophil counts taken prior to the injection of insulin and immediately after the termination of each treatment revealed changes which consistently indicated adrenocortical stimulation. Reduction of the number of circulating eosinophils varied from 50% to 90% during insulin therapy (*6*). The stimulating effect of insulin upon adrenocortical activity has been demonstrated by other investigators (*7–10*). Although the mechanism is uncertain, it has been suggested that the release of adrenalin and its effect upon the pituitary-adrenal axis is partially responsible; and this occurs despite the recognized antagonism between insulin and adrenocortical hormone upon the hexokinase system.

The consistent daily occurrence of eosinopoenia in response to insulin administration implies that the concomitantly increased uropepsin excretion during a course of insulin coma therapy furnishes here, as it does under other circumstances (*4*), a quantitative measure of adrenocortical activity. Although the eosinophil count furnishes a satisfactory test of adrenocortical *reactivity,* it does not provide a quantitative measure of the day-to-day fluctuations of adrenocortical function.

Our investigations of adrenocortical function and proteolytic enzyme kinetics have shown a great individual variability in the schizophrenic group and indicate a pronounced tendency toward hyperadrenocorticism and unstable protein metabolism, both at