

6.1×10^{-13} (dyne/cm²)⁻¹. However, it should be noted that the scatter points in Bridgman's compressibility measurements (2) is approximately 3 times that of ours and that Bridgman does not detect a break in the compressibility curve. A plot of $\Delta V/V$ against P at 30°C as given by Bridgman (1) (he smoothed data at 1-kb intervals) indicates that the initial compressibility is probably considerably higher than 10^{-13} which is the slope of his curve between 1 and 12 kb.

In an extended x-ray run in which the diffraction pattern was scanned every 5 kb, we found that Cr remains a body-centered cubic crystal structure from 0 to 55 kb at 28°C.

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References and Notes

1. W. Bridgman, *Proc. Am. Acad. Arts Sci.* 4, 27 (1933).
 2. *ibid.* 62, 207 (1927).
 3. Mitsui and C. T. Tomizuka, *Phys. Rev.* 137, A564 (1965).
 4. T. Litvin and E. G. Ponyatovskii, *Dokl. Akad. Nauk. SSSR* 156, 69 (1964); *English transl., Soviet Phys.-Dokl.* 9, 388 (1964).
 5. F. Voronov, *J. Exp. Theoret. Phys. USSR* 3, 1999 (1964); *English transl., Soviet Phys.-JETP* 20, 1342 (1965).
 6. D. Barnett and H. T. Hall, *Rev. Sci. Instr.* 35, 175 (1964).
 7. N. Jeffrey, J. D. Barnett, H. Vanfleeter, and H. T. Hall, in preparation.
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Sea-Level Changes during the Last 2000 Years at Point Barrow, Alaska

Abstract. *Eustatic rises of sea level between A.D. 265 and 500 and between A.D. 1000 and 1100 caused the formation of raised beaches. After the first rise, sea level dropped about 2 meters below the present level, permitting Eskimo settlement of Birnirk about A.D. 1000. The second rise of the ocean flooded Birnirk. At present, sea level is about 0.6 to 1.0 meter below the higher levels; the ocean partially floods Birnirk.*

During the summer of 1964 a fossil log was found in place in old beach ridges on Point Barrow, Alaska. Digging produced two more pieces of driftwood. These specimens were buried in an area where datable material had not been found and where the sediments were among the oldest on Point Barrow.

The samples were dated by radiocarbon methods in an attempt to add to the geologic history of the region. In particular, evidence for changes of sea level and their effect on early Eskimo settlements was desired. The dates should be of interest to scientists of several disciplines because the area has been used for studies in geology, anthropology, biology, limnology, and climatology. These studies are still in progress, and a major attempt is being made to unravel the Pleistocene and Recent history (1).

Point Barrow (Fig. 1) is the northernmost point in the United States. It was part of a spit until 3 October 1963, when a major storm breached the spit just northeast of its junction with the mainland. Because these breaks are expected to heal within a few years, the Point Barrow area is still referred to as the Barrow spit. The spit extends northeast from the mainland for a distance of 8 km to Point Barrow. There the spit hooks and curves southeastward for 5 km. In most areas, patterns of beach ridges occur. The sediment forming these ridges has been described by Rex (2) and by Péwé and Church (3). It is chiefly chert of sand and gravel sizes.

The beach ridges can be grouped into three series (Fig. 1) first recognized by Rex (2). The youngest series is actively growing and is on the west; the oldest is on the east. The older two series contain beaches higher than those in the youngest series. Elevations over 4 m above sea level are found along the ridges passing through reference mark No. 2 of the Nuwuk bench mark and Hole No. 4, drilled by Péwé and Church (Fig. 1). The beach ridges in the youngest series reach elevations of 3.5 m but are mostly about 2 m above sea level. In general, within the older two series, the higher beach ridges are on the west. Ice wedges can be found in the older sets of ridges; soil a few centimeters thick has developed on the oldest beaches.

The highest ridges of both older series of beaches are thought to have been formed when sea level was about 0.6 to 1.0 m higher than it is now, for they are about 0.6 to 1.0 m higher than the highest of the younger ridges and the same distance higher than the highest beach ridge built by the storm of 1963. Water from that storm did not wash over the highest older ridges. The storm was stronger and produced a higher sea level than any previously mentioned in Eskimo tales or recorded

by others; by conservative estimate, it was the worst storm in 100 years. Its severity was the result of record high winds and an unusually ice-free ocean. Therefore, while there is some possibility that a past storm built beach ridges over 4 m above sea level without a rise in sea level, it seems that a higher sea level is the more likely possibility. Moore also ascribed elevated beach ridges near Point Hope and Cape Krusenstern to higher stands of sea level (4).

The lower beach ridges in the older series may represent either low stands of the sea or ridges which were formed during average storms of the past. The old Eskimo site of Birnirk (Fig. 1), located on beach ridges forming the base of the Barrow spit, is at present partially drowned (5). During the occupation of this settlement, the sea must have been lower than it is now. Comparison with a nearby present-day Eskimo settlement suggests that the sea must have been about 2 m below its present level during the occupation of Birnirk. Moore (4) also thought that low stands of the sea were demonstrated at Point Hope.

The three pieces of driftwood found in 1964 in the eroded bluffs at Nuwuk were in beach deposits having an average dip of about 3° northwest. The stratigraphic position of each of the samples corresponded with the following ages (6): sample GX0380, 1700 ± 110 years ago; sample GX0381, 2365 ± 100 years; sample GX0230, 5575 ± 375 years.

The positions of the specimens were all related to the second reference mark of the Nuwuk bench mark (Fig. 1). The elevation of the top of the marker was taken as 4.2 m above mean low water. The oldest specimen (GX0230) was 22 m north 57° east of the reference mark and 2 m above mean low water. The specimen was a badly weathered log at least 2 m long and about 20 cm in diameter. The log had been split and the bottom was missing. The middle sample (GX0381) was 2.5 cm in diameter and 15 cm long. It was 22 m north 6½° west of the reference mark at an elevation of 1.4 m. Nearby was the youngest piece of wood (GX0380), 3.1 cm in diameter and 21.5 cm long. It was 21 m north 5½° west of the reference mark and 1.7 m above sea level.

All three specimens were found in the same beach ridge (Fig. 1). There was no evidence of a major stratigraphic break in the sediments containing the fossil wood. Hence the entire