gen atom is thus 23.1 $Å^3$, a typical value for hydrates.

Some interatomic distances and angles are listed in Table 2. The perxenate ion, XeO_6^{-4}, has approximately the form of a regular octahedron of oxygen atoms surrounding the central Xe. The O-Xe-O bond angles do not differ significantly from 90°. Although the Xe-O bond lengths do differ slightly, and might be expected to because of the different ways in which the four independent oxygen atoms appear to hydrogen-bond, the hypothesis, "the four independent Xe-O bond lengths are equal," cannot be rejected at the 5 percent significance level by a χ^2 test. The ion is required by its position in the unit cell to have a twofold axis passing through Xe, O_1, and O_2, and our results indicate that the symmetry of the ion may not be significantly different from O_h. The mean bond length is 1.875 Å with a standard deviation of the mean of 0.021 Å. This is 0.12 Å longer than the average Xe-O distance of XeO_3 (*4*). This compares well with the increase of 0.11 Å in the I-O distances in the isoelectronic iodine-containing ions. The I-O bond length in a typical iodate ion is 1.82 Å (*5*), while in the IO_6^{-5} ion in $(NH_4)_2H_3IO_6$ it is 1.93 Å (*6*).

Each of the two independent sodium ions is coordinated to six oxygen atoms in a distorted octahedral arrangement, with Na-O distances ranging from 2.39 to 2.70 Å. In the complex hydrogen-bonding scheme postulated for the structure, each of the oxygens of an XeO_6^{-4} octahedron is involved in hydrogen bonding to water. This hydrogen bonding and the linking of the sodium octahedra by the sharing of edges and corners appear to determine the overall structure of the crystal (*7*).

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5 July 1963

High Pressure X-ray Diffraction Studies on Barium

Abstract. *Simultaneous x-ray diffraction and electrical resistance measurements on barium establish, with certainty, that Bridgman's 78-kb resistance transition is identical with his 59-kb volume transition. During this transition, the body-centered cubic structure changes to hexagonal-close packed. Lattice parameters for the latter structure at 62 kb (volume scale) are:* a = *3.90 Å,* c = *6.15 Å, and* c/a = *1.58. Compression* ($\Delta V/V_0$) *at 62 kb is 0.359 ± 0.005 compared to 0.345 previously reported by Bridgman. Below the transition, at 49 kb, compression is 0.300 ± 0.005 compared to Bridgman's 0.288. Bridgman's 17-kb volume transition was not detected by x-ray diffraction.*

In addition to the intrinsic interest of determining the crystallographic nature of pressure-induced phase changes previously reported to occur in barium (by displacement and electrical resistance measurements), x-ray measurements are important because the 59-kb transition is used as a fixed-pressure calibration point. In 1942, Bridgman published compressions of Ba to 100 kb and reported two volume discontinuities (*1*). The first of these was said to occur at 17 kb with compressions ($\Delta V/V_0$) of 0.135 and 0.141. The second was reported to occur at 59 kb with compressions of 0.318 and 0.337.

In 1952, Bridgman published a curve of the relative electrical resistance of Ba to 100 kb (*2*). There was a sharp resistance discontinuity occurring at 78 kb (which Bridgman suggested might be associated with the 59-kb volume discontinuity observed 10 years earlier). He also reported evidence of a small electrical resistance discontinuity related to the 17-kb volume change.

During the early development of ultra-high pressure, high-temperature apparatus, researchers assumed 78 kb to be the correct value for the Ba resistance transition and used it as a fixed-pressure reference point. This was comfortable because this value, along with Bridgman's values for electrical resistance transitions in Tl (44 kb) and Cs (54 kb), gave a straight-line relationship between applied load and chamber pressure. This "old" pressure scale was unquestioned until Kennedy (*3*) suggested that Bridgman's resistance transitions in Tl, Cs, and Ba were all too high and that these transitions were actually identical with Bridgman's volume transitions reported to occur at about 25-percent lower pressure. Very shortly thereafter, researchers generally accepted the identity of the resistance and volume transitions, and adopted a "new" pressure scale which accepted pressure values based on the volume transitions (37, 42, and 59 kb in Tl, Cs, and Ba, respectively).

We have now been able to establish with certainty the fact that Bridgman's 78-kb electrical resistance transition and his 59-kb volume transition occur at the same pressure. This has been made possible by the development of a tetrahedral, x-ray diffraction, high-pressure, high-temperature press at Brigham Young University. This apparatus is equipped with a modified x-ray diffractometer and both strip-chart and print-out recording devices. With this equipment, the electrical resistance of Ba foil was monitored (at room temperature) simultaneously with the monitoring of its Debye-Scherrer diffraction pattern as pressure was slowly increased. A new diffraction pattern appeared simultaneously with the crossing of the resistance discontinuity. This was observed in five separate and independent experiments. The new pattern indicates transformation to a hexagonal close-packed structure. Diffraction data at 62 kb (new scale) for the new structure are presented in Table 1. At 62 kb the values for the lattice parameters *a* and *c* are 3.90 Å and 6.15 Å, respectively. The *c/a* ratio is 1.58 which is within the normal range for hexagonal close-packed metals.

Table 1. Diffraction data for Ba with hexagonal close-packed structure at 62 kb.

hkl	$d_{calc.}$*	$d_{exp.}$	$I_{calc.}$	$I_{exp.}$†
100	3.379	3.376	24	32
002	3.077	3.074	25	38
101	2.962	2.963	100	100
102	2.275	2.264	17	14
110	1.950	1.954	22	23
103	1.754	1.748	23	17
200	1.688		4	
112	1.647	1.646	7	11‡
201	1.628	1.627	19	20‡
004	1.539	1.533	4	5
202	1.481		5	
104	1.400	1.395	4	2
203	1.305	1.305	9	3
210	1.277		3	
211	1.250	1.250	16	5

* Calculated for a = 3.901 Å and c = 6.154 Å; c/a = 1.578. † Integrated intensity. ‡ Incompletely resolved lines.

Bridgman's compression for Ba at 62 kb is 0.345 compared to our x-ray value of 0.359 ± 0.005. Below the transition, at 49 kb, Bridgman's compression is 0.288; ours is 0.300 ± 0.005. In both instances our measurements indicate 4 percent greater compression than Bridgman's, but they confirm his volume transition and its magnitude.

Diffraction measurements at pressures up to the 59-kb transition (at room temperature) indicate only the presence of the normal body-centered cubic structure. We observed no discontinuity in d values in the vicinity of 17 kb. This casts serious doubt on the existence of a transition at this point (*4*).

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16 July 1963

Serum Uric Acid in Young Mongoloids

Abstract. *A highly significant increase (P < .005) in average uric acid level was found in the blood serum of 25 mongoloids in the age range of 2 to 12 years, with a mean age of 6 years, when levels were compared with those in nonmongoloid, mentally retarded children. These data confirm our previous results with 40 mongoloids whose mean age was 23.7 years, and indicate that elevated uric acid levels are present throughout most of the life of these subjects.*

We have shown previously (*1*) that serum uric acid levels are elevated in mongolism. Since only four of the mongoloids were less than 10 years of age (age range 6 to 47, mean age 23.7 years), a sampling of younger mongoloids was needed. Inasmuch as the Fort Wayne State School has no mental retardates under 6 years of age, blood samples were obtained from children at the Northern Indiana Children's Hospital, South Bend, Indiana (*2*).

Sixteen male mongoloids and nine female mongoloids were matched with respect to age and sex to other nonmongoloid mental retardates, who were not suffering from any known metabolic disturbances. All subjects were on the same institutional diet and other environmental conditions were similar. None were receiving any medication known to affect serum uric acid. One blood sample from each fasted subject was obtained by venipuncture or heel puncture, and the serum was frozen immediately and later stored in the deep freeze at the Fort Wayne State School.

Uric acid in the serum was determined by an ultramicro modification of the method of Eichhorn *et al.* (*3*). In each determination 25 μl instead of 0.3 ml of serum were used, and all volumes were decreased proportionately. Optical density was measured in a Beckman DU spectrophotometer at the absorption maximum of 710 mμ exactly 10 minutes after the addition of phosphotungstic acid. The average standard deviation of triplicate or quadruplicate determinations was ± 0.07 mg/100 ml for the 50 samples of serum examined.

In Table 1 are listed the mean values of triplicate or quadruplicate determinations. The average amount of uric acid in the serum of the mongoloids was 5.42 mg/100 ml, which is significantly higher ($P < .005$) than the average level of 3.87 mg/100 ml in the other retardates (*4*). Uric acid levels were not related significantly to age or sex in either group. These data confirm our previous results (*1*), and indicate that elevated uric acid levels are present throughout most of the life of the mongoloid.

In the present study, the average uric acid levels (5.42 and 3.87 mg per 100 ml for mongoloids and nonmongoloids, respectively) are both lower than those observed previously (*1*) in older subjects (6.36 and 5.06 mg per 100 ml, respectively). These differences can not be explained on the basis of methodology, since a micromodification of the method used previously was used in this study. One explanation may be that the food served at the Northern Indiana Children's Hospital has a lower purine content than that served at the Fort Wayne State School. Because of this variable, average uric acid values are significant only when groups are compared under the same environmental conditions (*5*).

Table. Uric acid levels (mg/100 ml serum).

Age	Mongoloids	Others
	Males	
2	5.78	6.07
3	4.75	3.67
4	6.48	3.71
4	5.49	3.61
4	4.20	3.20
4	4.17	3.16
5	6.82	5.15
6	4.85	4.14
6	5.56	4.23
6	4.48	3.31
7	5.61	1.71
8	3.07	3.45
8	4.90	2.90
8	6.15	5.96
9	5.30	4.30
12	4.77	4.02
	Females	
3	5.92	5.04
3	4.66	3.31
4	4.36	3.72
5	5.32	3.01
5	7.79	3.91
7	9.62	4.09
7	5.35	2.88
9	6.26	2.06
10	4.06	4.51

Range (and average):	
Male mongoloids:	3.07–6.82 (5.15)
Other males:	1.71–6.07 (3.91)
Female mongoloids:	4.06–9.62 (5.93)
Other females:	2.06–5.04 (3.61)
Average (all mongoloids)	5.42
Average (all nonmongoloids)	3.87

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3 June 1963