of Cladodontidæ *Cladodus striatus*. As the name *striatus* was preoccupied, having been applied by Agassiz to a species of *Cladodus* from the Devonian, I suggest that the new species be named *Cladodus compressus*. The following is the original description.

Cladodus compressus

Teeth of medium size, base of type specimen 14 mm. wide by about 5 mm. long, tooth broader than high. Outline of base subelliptical, extremities subangular, posterior border with stronger convexity than anterior; under surface smooth, upper surface with a narrow furrow just behind the cones running parallel with the posterior margin of the base, a strong ridge between this furrow and the posterior margin. Middle cone low, broad and thin near base, twice as broad as thick, with sharp cutting edges; outer lateral denticles broad, thin, and very low, one third to one fourth height of median cone; between lateral denticles and median cone a high narrow ridge that bears two minute denticles on one side of the median cone but none on the other side in the type specimen; median cone and lateral denticles all marked with almost vertical, narrow, sharp-crested ridges; spaces between ridges about twice as broad as ridges.

C. compressus differs from *C. euglyphœus*, the nearest allied species, in its much larger size, much greater breadth of median cone, greater breadth and less height of outer lateral denticles, smaller number of lateral denticles, high ridge between outer denticles and main cone, and in the greater approximation of the ridges on the teeth.

Formation and Locality—Salem limestone, Paynter's Hill, Ind.

Type specimen No. 7709—1 American Museum of Natural History.

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THE TERM "THERM"

To the Editor of Science: I have noted in the recent issues of Science discussions in regard to the use of the term "Therm" as a simple way of expressing 1 million gram calories.

While this old term used in a new sense may simplify an expression, it, however, to my mind makes it more complicated as far as its actual meaning is concerned.

The trend to-day in all scientific matters, and primarily it is the object of research, is to bring all phenomena and facts down to a common basis of understanding so that as far as possible one can tell at a glance what the subject is about.

The arbitrary use of a term without the sanction or adoption by the majority of persons or countries engaged in research of the kind to which the term is to be applied, tends more to confuse than to simplify matters.

I am heartily in accord with the suggestion for the term kilo-calorie, mega-calorie, etc., made by A. T. Jones in Science of January 3, 1908.

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SPECIAL ARTICLES

NOTES ON THE OCCURRENCE OF THE RECENTLY DESCRIBED GEM MINERAL, BENITOITE

During the course of the writer's investigations in the Coalinga oil field, Fresno County, California, the past summer, he was accorded the opportunity of examining the mine from which the new gem mineral, benitoite, is obtained. At the time Dr. Louderback[1] described the mineral, he had examined only a limited amount of material and had had no opportunity of visiting the type locality. The following notes on the field relations of the gem are therefore offered as an addendum to his paper. The writer wishes to extend his thanks to the owners of the mine, Messrs. R. H. Dallas and L. B. Hawkins, the latter one of the discoverers of the mineral, for permission to visit the mine, for the gift of a representative series of specimens, and for other courtesies.

Benitoite, according to Louderback and

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[1] "Benitoite, a New California Gem Mineral," by George Davis Louderback, with chemical analyses by Walter C. Blasdale: *Bull. Dept. Geol., Univ. Calif.*, Vol. V., No. 9, pp. 149–153, July, 1907.

Blasdale's determination is a very acid titanosilicate of barium possessing the following properties: It varies in color from dark blue through light blue to colorless, this property having led to the original belief that the gem was sapphire. The pleochroism is very marked, the ordinary ray being colorless, while the extraordinary is blue, with a violet tint when intense. The absorption is $e > 0$. The refractive indices are high, $0 = 1.77$, $e = 1.80$, in sodium light. The double refraction is therefore very strong and the mineral optically positive. Benitoite crystallizes in the hexagonal system, trigonal division, the most common habit being pyramidal. The individual crystals are usually less than a centimeter in maximum diameter, although they occasionally attain a size of 2.5 centimeters (one inch). The hardness is 6¼ to 6½, or below quartz; the density is 3.64 to 3.65. The mineral fuses at about 3, is almost insoluble in hydrochloric acid, quite easily attacked by hydrofluoric acid, and dissolves readily in fused sodium carbonate. Associated with the benitoite is a black or brownish-black prismatic mineral which Dr. Louderback believes to be new, and to which he has given the name carlosite.[2]

Benitoite and carlosite occur as individual crystals associated with veins or geodes of a white zeolite (which Mr. W. T. Schaller has identified as natrolite), in a great schist lens, enclosed by one of the largest areas of serpentine found in the Coast Range of California. This serpentine mass occupies five or six miles of the crest of the ridge north of White Creek in the western part of Fresno County, twenty-five miles northwest of Coalinga, and extends northwestward at least four or five miles into San Benito County. Many irregular lenses and masses of schist and several kinds of more or less basic igneous rocks are associated with the serpentine. The particular schist lens containing the gem mineral cuts through a low hill of serpentine at the bend in one of the headwaters of the San Benito River. The lens is about 150 feet wide at its widest part, at least 1,200 feet long, strikes about N. 70° W. and appears to dip N. 20° E. at angles varying from 70° to 80°. The relations are best studied in the shallow cuts, which comprise the present development works, and which are confined largely to the middle of the southeastern portion of the lens.

The country rock of the gem-bearing natrolite veins is a schist containing glaucophane, and varying in color from dark greenish gray to a rather light blue. Near the lower or southwestern contact with the serpentine (the latter being soft, light-colored and containing numerous thin, flaky asbestos veins) the schist is dark greenish, fine-grained, and breaks with a sharp-edged angular fracture. It contains veins up to three eighths of an inch in thickness, of a light greenish mineral, resembling chlorite, which can be scratched with a knife. The joint faces are coated with thin films having the characteristics of manganese oxide. A peculiar-looking mineral, somewhat resembling iron pyrites in appearance, but quite soft, occurs sparingly in thin veins throughout this part of the lens. Some faint copper stains were also noted at one place. In the immediate vicinity of the gem-bearing veins toward the middle of the schist area the rock is blue, has been considerably altered, probably by the waters carrying the vein and gem-forming materials, and breaks with a fine, granular fracture exposing component crystals discernible with the unaided eye. The schist adjacent to the veins is often largely replaced by natrolite. The planes of schistosity are more plainly visible in the bluer variety, which is apparently the richer in glaucophane. Where extremely weathered and wet the altered schist has the appearance and feel of a tough blue clay. Weathered surfaces of the schist are rough, sometimes being covered by mammilliform nodes. This nodular occurrence is also encountered below the surface in the more weathered and porous portions of the rock. The color of the weathered surfaces is bluish gray to reddish brown, the latter due to iron oxide. The schist usually weathers faster than the natrolite or benitoite and seems to have been protected over those areas which once formed the wall or is at present covered with the remains of a natrolite vein. On one

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[2] *Op. cit.*, p. 153.

exposed rock surface about 2½ by 4 feet were over 200 more or less imperfect benitoite crystals, amid thin patches of remaining natrolite, the whole standing out prominently from the surrounding rough and unprotected surface of the schist.

The altered portions of the schist are full of cracks and cavities, varying in size up to two or three inches in width, and having a rough orientation parallel to the planes of schistosity. The cavities are for the most part filled with natrolite, with which benitoite or carlosite or both are often associated. The natrolite is not always accompanied by benitoite and carlosite, but in no instance noted did the benitoite occur without the natrolite and in only a few cases was the carlosite found alone. A soft dark brown mineral substance, resembling cadmium oxide, is also sometimes associated with the natrolite. It is not uncommon to find the cavities only partially filled, in which case the occurrence resembles a geode, the crystals of the natrolite (sometimes associated with benitoite and carlosite) forming the inner surface. The natrolite in such cases is usually coated with a brownish or brownish-yellow stain, or is covered by an intricate mass of microscopic, needle-like crystals of a peculiar greenish-drab color.

As a usual thing the benitoite and carlosite are in contact with the country rock, the carlosite sometimes having one extremity buried in it, while the remainder of the crystal extends into the natrolite. One instance was noted where a long slender carlosite crystal extended across a vein of natrolite with an extremity penetrating the schist on either side. The facts above noted imply the crystallization of the benitoite and carlosite previous to the complete deposition of the natrolite. Isolated crystals of the benitoite and carlosite are not rare in masses of natrolite, however, so that possibly the crystallization of the three minerals was practically contemporaneous, at least in certain instances. In some cases the benitoite appears to be entirely surrounded by the schist, but a close examination usually reveals a thin film of natrolite between the former and the country rock. In the places where the carlosite occurs alone or associated with only minor quantities of natrolite, the carlosite is in the form of thin veins, the crystals being imperfect and forming a series of thin plates or flakes. Close associations of the benitoite and carlosite are not uncommon and indicate contemporaneity of origin for the two minerals. No alteration of the natrolite or benitoite was noticed, but red stains resembling iron oxide were seen emanating from around several of the carlosite crystals. Mr. Schaller has called the writer's attention to the fact that minute fragments of the carlosite also show a brick-red color, so that the coloring around the crystals may be due to fine particles of the unaltered mineral.

Development work has so far been confined to near the middle of the schist lens, and consists of a tunnel and several open cuts following the strike of the schist. The tunnel is 50 feet long and the largest cut 10 feet deep, 4 feet wide and 14 feet long. The gems are secured either by pounding up the richer portions of the matrix and then picking out the few crystals or fragments that have withstood the shock, or else chiseling out the larger individual crystals at the expense of the smaller surrounding ones. Only a small percentage of the gems are saved by either method, as the crystals are very brittle and usually considerably jointed and cracked. The present value of the cut stones is said to be $40 per carat.

RALPH ARNOLD

COALINGA, CALIFORNIA,
September, 1907

NOTES ON ORGANIC CHEMISTRY

KETEN

A NUMBER of derivatives of ketene have been known for some time and the announcement has just been made of the preparation of the parent compound.[1] This substance is of great interest because it is the simplest member of the highly important class of ketones and, moreover, it is the simplest anhydride of acetic acid. Its mode of formation and reactions show that its formula is $H_2C:CO$, *i. e.*, it is *methylene ketone;* the

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[1] N. G. M. Wilsmore, *Jour. Chem. Soc.* (London), **91**, 1938 (1907).