still use the names of the Emperor Nicholas II Land and Tsarevich Alexei Island,[2] introduced by the hydrographic expedition in 1913.

Every change of geographic names must be authorized in some way, and their indiscriminate introduction should never happen. Therefore, there is no reason to introduce the name of Lenin Land against the decision of the most ardent admirers of the late Russian dictator.

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LESSONS FROM THE ST. FRANCIS DAM

THE disaster caused by failure of the St. Francis Dam, near Los Angeles, California, on March 12 and 13 of this year, will long be remembered. Within a brief interval of time hundreds of lives were lost, a fertile valley was reduced to a scene of desolation, and property valued at many millions of dollars was destroyed. The general attention aroused throughout the country was due not merely to the magnitude of the disaster, but also to its unusual character. There have been few failures of large dams; and the collapse of the St. Francis structure, which was new and built of massive concrete, astonished engineers and laymen alike.

With commendable promptness, the governor of California appointed an impartial and able commission to investigate the causes of the failure. With commendable good sense he recognized the place of geology in the investigation and appointed two geologists to serve with four engineers. This commission made a thorough study of the problem in all its aspects, and a printed report was issued recently.[1] The report is a brief, straightforward statement of facts and conclusions. It merits careful study by every civil engineer, every geologist and every one who is interested in the relation of large structural projects to the public safety.

The most significant conclusion of the commission is contained in one direct, unqualified sentence: "The failure of St. Francis Dam was due to defective foundations." So far as the evidence can show, the dam itself was perfectly sound both in design and in construction; but it goes without saying that the best dam in the world, if erected on a weak and leaky base, is a public menace. The degree of defectiveness in the foundations of the St. Francis structure is made clear by the report. Mica schist, a rock made up of thin, weak layers or folia, is the bedrock beneath the bottom and one side of the valley at the dam site. Conglomerate, composed of poorly cemented gravel and other detritus, underlies the other valley wall. Thus the bedrock is inherently weak under the entire dam; but to make matters much worse, the conglomerate and schist are separated by a wide zone of shearing, in which the rocks have been ground and mashed by powerful earth-forces. When a sample of material from this zone is placed in water it disintegrates rapidly to incoherent particles. Yet this mass of material lay directly under the dam, subject to the softening action and to the enormous pressure of water in the reservoir. It appears, then, that the foundation of the dam had many elements of weakness and none of strength.

The geologic conditions in the valley, including the existence of the shear zone or *fault,* were well known to geologists before the dam was built. No competent geologist would have approved the dam site without serious reservation, and probably very few would have consented to construction of the dam in that place under any consideration. But it does not appear that any geologist had a hand in selecting the site, or in making inspection of the work as it progressed. Why not? The same geologists who took part in the "post mortem," as well as numerous others who knew the local geology, could have been consulted in the beginning. Their knowledge, had it been used at the proper time, would have prevented the catastrophe.

It is easy to point out errors after the damage is done; and not infrequently certain individuals or organizations receive an unjust share of blame for which a common condition or system is responsible. This article is not written with the purpose of censuring any person or any institution. It is intended rather as a protest against a situation that exists in many states, both east and west. There seems to be a tacit assumption in many quarters that the ordinary training of the construction engineer fits him to solve all geological problems he may encounter in his work. It is no reflection on engineers, individually or collectively, to state that this assumption is fallacious. Geology is a complex subject. Many of its problems tax all the resources of men who have devoted the best years of their lives to its study. Without question most engineers charged with the building of dams and other large structures would welcome cooperation by competent geologic specialists.

Disasters always call forth some condemnation of the *status quo* and many suggestions for improvement. In discussions stimulated by the breaking of St. Francis Dam the claim has been made that a special

[2] New map of the Arctic Region in Pet. Mitt., Erhänz. Heft 191. Also Stiller's Hand-Atlas, Zehnte Auflage.

[1] Report of the commission appointed by Governor C. C. Young to investigate the causes leading to the failure of the St. Francis Dam near Saugus, California; Calif. State Printing Office, Sacramento, 1928.

study of geology should be required of all civil engineering students. Certainly a course in the fundamental principles of geology, emphasizing the applications to engineering practice, should have an important place in the training of construction engineers. Many schools include such a course in their curricula. It cannot be expected, however, that the student will become proficient as an engineer and as a geologist at the same time. He should of course have some basis for appreciating the nature of geologic problems that may confront him in his work. Such an appreciation will serve to emphasize in his mind the need for cooperation with highly trained geologists.

Governor Young's commission stresses the desirability of having all such structures as the St. Francis Dam "erected and maintained under the supervision and control of state authorities." Surely the people of California ought to demand no less than this, because "while the benefits accrue to the builders of such projects, the failures bring disaster to others who have no control over the design, construction and maintenance of such works." Unquestionably state supervision decreases the danger; but in the writer's opinion a further step is desirable—the participation of geologists in the selection and final approval of dam sites should be specifically provided. Certain states require official inspection of such sites, but commonly the board is made up of engineers only. If the system of state supervision were universal, and if each board of engineers for inspection and approval of dam sites included at least one competent geologist, the danger of disastrous failures would be in large part removed.

High dams for water supply and for power projects are essential for present and future development; and doubtless the number of such structures will increase rapidly, especially in certain parts of the West. The recent experience in California furnishes a plain warning that geological conditions at dam sites cannot be ignored. There is reason to believe that California will profit from the lesson. It is the duty of other states also to take any measures that promise to prevent similar disasters within their borders.

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ISONTIC?

ONE of the useful premises of science is that between two points equal in some respect there does not tend to be change in that respect. Thus lines or surfaces connecting points that are equal in some respect play a great rôle and we have a number of names applied to particular varieties such as contours for lines of equal elevation, levels, niveaux. Particularly common are words beginning with "iso"—such as:

isotherm, line connecting points of equal temperature;
isobar, line connecting points under equal atmospheric pressure;
isogam, surface or line of equal gravitative attraction;
isochlor, line connecting points where the water (?) has equal chlorin, etc., etc.

Now I think I need, and it might be useful to others, a word to apply to any line or surface drawn through points equal in some respect, and upon due application to my dictionary and my colleague, Professor Wyatt, I think *isontic* (being equal or equal in being) is about the word I want.

What do others think? One could then speak of a gravitation isontic, meaning thereby the curve connecting all the points where the force of gravitation had the same value, or a sodium isontic in the ocean, connecting point where the seawater had the same per cent. of sodium, of an evaporation isontic or a radium isontic, and if it came into general use be understood, and one would not have to use a long phrase or some queer hybrid or have to hunt up some Greek equivalent which might not be familiar. Is there some word already that will meet my need?

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A NOTE ON ASTASIA CAPTIVA BEAUCH!

IN rich cultures of *Stentor coerulens* and of *Spirostomum ambiguum*, which were being used for micrurgical studies, I noticed recently a small euglenoid form living with these ciliates, either as a commensal or an endoparasite. They were actively crawling about in the cortical layer of the ectoplasm, just below the pellicle. Their course seemed, on careful focussing, to be restricted to this region.

The shape of the cells was fusiform, the anterior and posterior ends were rounded, and the paramylum granules were in the form of elongated rods. The animals exhibited a high degree of metaboly, during which both anterior and posterior ends retained their rounded form. Accurate cell measurements could not be made on account of the constant metabolic movement, but the length of the cell did not exceed 40 μ when fully extended. No flagellum was seen, nor was a stigma visible.

On the basis of these characters, the form has been identified as *Astasia captiva* Beauchamp, previously reported as an endoparasite in the *Rhabdocoele, Catenula lemnae*, in France.

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