

as a necessary consequence of Riemann's geometry, when one only makes the supposition that there exists a "principle of least action" the domination of which we observe everywhere in physics. It is very surprising that choosing the simplest form of this principle in Riemann's geometry which is suggested by a very natural requirement, we find a combination of two functions, one of which leads to gravitation and the other to electromagnetism.

We considered here only the fundamental facts of electromagnetism, viz. those connected with the field. A later elaboration must show whether there exists a possibility of understanding the inner structure of matter through this new unification of gravitation and electricity. The reason for this is that the whole theory is based upon the idea that the equations which we have found are

valid *everywhere*, without exception. The special character of "matter" can be understood only as a consequence of the fact that there are certain small regions in space where the field-intensity becomes very high and the usual approximation which is permitted in weak fields and which corresponds to the classical laws of the electromagnetic field, is no longer valid. These regions are to be considered as the representation of material particles. We can expect to explain in this way in particular the fundamental identity of the change of every electron, and possibly in general the existence of universal constants in nature.

At present no evidence has yet appeared which would tend to show a probable connection between this field-theory and modern quantum-theory.

Science News Letter, December 5, 1931

CHEMISTRY

Third Competitor Enters Race for Missing Element 87

BLINDNESS threatening Prof. Gustave A. Aartovaara of Helsingfors, Finland, in his search for the missing chemical element 87, has aroused the anxiety of scientists of the U. S. Bureau of Standards, who have been working with him in seeking one of the last two remaining building blocks of the universe. Glass fragments severely injured his eyes as a result of an explosion of his apparatus, reports state.

As a third competitor in the race to identify this elusive metallic element, Prof. Aartovaara of the Helsingfors Technical University, had sent a sample of his preparation to be examined by Dr. W. F. Meggers of the U. S. Bureau of Standards, whose report on the optical spectrum has just been announced. The announcement comes on the heels of a rival claim by Prof. Jacob Papish of Cornell University, who declared he found the missing alkali in the rare mineral samarskite. The third contestant for the honor of completing the chemists' periodic table is Prof. Fred Allison of the Alabama Polytechnic Institute, who first announced the discovery of the missing alkali about a year ago, through the use of a magneto-optic method of his own invention.

No specific evidence that the Finnish preparation actually contains number 87 has been found, Dr. Meggers an-

nounced, though the spectra of all the related alkali metals, including sodium and potassium, were found. The crucial lines in the optical spectrum, he declared, will lie in the infra-red region where investigation is troublesome. Only the X-ray spectrum, used by the Cornell scientists, can decide the question definitely, in Dr. Meggers' opinion.

On the other hand, Dr. Meggers doubts whether Prof. Papish has given convincing measurements actually proving the existence of number 87 in his extract.

Prof. Aartovaara's substance differs from those of Prof. Allison and Prof. Papish in that it is radioactive, as might be expected from its nearness to radium in the periodic table of chemical elements. The reported explosion that injured Prof. Aartovaara is believed to have been due to the action of the radioactive rays on the solution.

Chemists recall, however, that a radioactive alkali solution was examined in 1908 for the missing element by the German chemist, Ebler. None was found. The activity was due to a trace of a known radioactive element.

Similar hopes entertained by investigators about radioactive alkali preparations have all been unfulfilled in the past.

Science News Letter, December 5, 1931

ASTRONOMY

Faint Nebulae May be Most Distant Objects

A GROUP of faint nebulae, just visible through the large reflecting telescope of the Bergedorf Observatory, Hamburg, has been discovered by Dr. Walter Baade. He believes them to be considerably more distant than another group of faint nebulae, like those in the constellation of Ursa Major, the great bear, which he discovered several years ago. These have been shown, by astronomers at the Mt. Wilson Observatory, to be about 70 million light years distant.

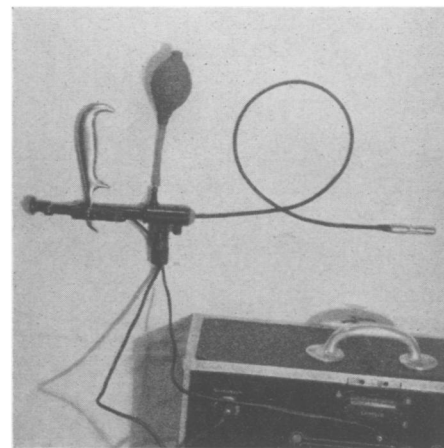
Only one more distant group of objects have been measured—some nebulae in the constellation of Leo, the lion—which appears to be about 105 million light years away. If the Ursa Major group is more than this, it will be the most distant object known to astronomers. The newly discovered nebulae are within a distance of about half a degree, the diameter of the moon, of the star Merak, the pointer farthest from the pole star, at the corner of the great dipper diagonally opposite the handle.

Science News Letter, December 5, 1931

MEDICINE

Camera and X-Rays Used to Locate Ulcers in Stomach

A COMBINATION of X-rays and a tiny camera which is lowered into the stomach now gives the physician or surgeon a means of determining more exactly the location of ulcers or other lesions in the stomach, Dr. P. E. Thal



EIGHT STOMACH PICTURES
Are taken within the little bulb on the end of the spiral tube after it has been inserted in the organ.

of Chicago told members of the Radiological Society of North America.

The camera consists really of two cameras, one above and one below an illuminating bulb, Dr. Thal explained. The whole arrangement is small enough to be passed into the stomach easily. A flexible tube from the camera carries the manipulating mechanism. Each camera has four film chambers arranged so that tiny photographs are made of four sides of the stomach walls. Thus eight pictures may be made at one time, covering the entire interior area.

By means of the X-ray, the physician can see the camera in the stomach and guide it to the best place to take the pictures. When all is ready, the exposure is made by opening the shutter and flashing the light. The picture tells the surgeon just where he may expect to find the ulcer he wishes to remove.

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GEOGRAPHY

Uncle Sam's Coast Surveys Speeded up by Airplane

SHORE LINES of the Atlantic and Gulf coasts, with their complicated inside waterways, are being mapped at one-third to one-fifth the former cost, the annual report of the director of the U. S. Coast and Geodetic Survey reveals. Airplane photography is the secret.

Over territory where ground crews plod laboriously for months, a plane sweeps in a single day. Constant revision of these charts necessitated by harbor developments and shifting sands, helps to make the air-photo scheme twenty to thirty per cent. more efficient than the old ground methods.

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SOCIOLOGY

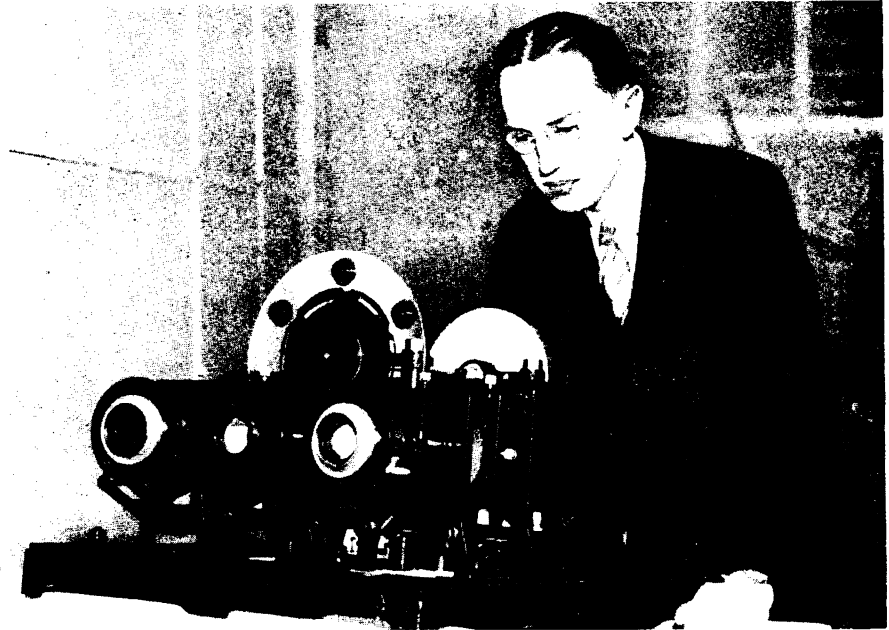
Irish Immigrants Becoming Emigrants

THE IRISH immigrant is now an emigrant.

Statistics of emigration for the first six months of this year show that during that time the number going to the "Old Country" outnumbered by 604 those coming to the United States, it is indicated by a report in the current issue of *Eugenical News*.

Two possible reasons are suggested for this turn of events: the economic depression, which has discouraged migration; and the legal restrictions imposed by the United States.

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THREE MAGIC LANTERNS IN ONE

The sun eclipse projector and its designer, James Stokley, associate director of the Franklin Institute Museum, Philadelphia. This machine will speed up the motion of the moon sixty times.

ASTRONOMY

New Projector Will Produce Eclipses of Sun on Demand

VISITORS to the new Franklin Institute Museum, now being erected in Philadelphia, will be able to see eclipses of the sun at any time with the aid of a new projector. The machine was constructed by the Bausch and Lomb Optical Company after the design of James Stokley, associate director of the Museum in charge of astronomy. It shows partial, annular and total eclipses, the latter with the Baily's beads, spots of light visible at the beginning and end of a total eclipse and caused by the sun's light shining through valleys on the edge of the moon, as well as the corona. The latter is the outer layer of the sun, visible only at eclipse time, and appears as bright streamers.

The machine makes use of three projectors, each similar to an ordinary magic lantern. The center one projects a circular spot of light, representing the sun. In front of the circular hole which forms this spot revolves a glass disc to which are attached a series of smaller discs, approximately the size of the hole. One disc crosses the hole to one side, producing a partial eclipse. The next one crosses the hole centrally, but is

somewhat smaller than the hole. This gives the effect of the annular eclipse, such as occurs when the moon is a little farther from the earth than at most eclipses, and a ring, or "annulus," of sunlight is seen around the moon. The third disc completely covers the hole, and as it does so, one of the other projectors flashes on momentarily, to show the Baily's beads. This quickly fades into the corona, which remains visible for several seconds. Then the Baily's beads reappear, but on the opposite side of the sun, and then they fade into the returning crescent of sunlight, which gradually increases until the uneclipsed sun is again shining. After that, the entire cycle is repeated, over and over.

A small motor operates the mechanism, which moves at a rate such that the normal motion of the moon is speeded up approximately 60 times. Several cams operate mercury switches which turn on the outer lanterns at the right time, and automatic irises which cause the fade-in from Baily's beads to corona and back.

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