foundation of the Peruvian government was an agrarian communism derived from the rights of the primitive gentes, very much as was the case not only in other parts of America, but, as the author observes, among the ancient Aryans as well. This explanation he develops in a highly satisfactory manner.

The claim, however, which Mr. Cunow puts forward in his preface, that he is the first to make these facts clear, is, doubtless unwittingly, unjust to a worthy American student, Dr. Gustav Brühl, who in his learned volume, 'Die Culturvölker Alt-Amerikas,' Chap. XVII. (Cincinnati, 1887), traces with entire clearness the Peruvian organization to the same source as does Cunow. It is to be hoped that in a future edition the latter will make proper acknowledgment of this.

THE INTERNATIONAL CONGRESS OF AMERICANISTS.

Mr. E. de Olivarria y Ferrari has issued at Mexico the 'Cronica del Undesimo Congreso Internacional de Americanistas' (pp. 183), giving a narrative of the proceedings of the Congress, its meetings and excursions (not abstracts of papers). The outlines were reported to Science at the time by Mr. Halsted. The present volume proves still further how courteous and kindly was the reception accorded to the Congress by the authorities and citizens of Mexico.

That meeting, however, was not a regular, but an extra session. The Congress meets only once in two years, and at the last regular meeting, in Stockholm, 1894, it was agreed to convene next in Holland, probably at the Hague. This is still the intention, and the last number of the 'Internationales Archiv für Ethnographie' contains an announcement to that effect. The precise date will be determined later. The volume of proceedings at Stockholm has not yet been issued. The Compte-rendus of the Congress, now numbering many volumes, the first of which was published in 1875, contain numerous articles of value to the student of the archæology and languages of America.

WORD-COUPLING LANGUAGES.

Sometimes a single linguistic procedure serves as a valuable trait by which to group linguistic stocks and measure their relative development. Such is the plan of uniting words one to another, so as to form compounds. This has been studied by several writers, and lately by Dr. H. C. Müller, of Leyden, in a monograph, 'Beiträge zur Lehre der Wortzusammensetzung' (pp. 59). While mainly devoted to the Aryan group, he has the breadth of mind, rare among Aryan specialists, to remember that all tongues are not built on Aryan models, and therefore calls under consideration the Ural-Altaic, Australian, and even, *mirabile dictu*, the American languages, for purposes of comparison. In this particular field the last mentioned offer peculiarly abundant topics of study in their synthetic and incorporative character, to which the author alludes, but perceives that the field is too vast to be surveyed in a few pages.

In some groups of tongues, as the Sinitic, word-coupling cannot be said to exist in the sense of the *dvandva* of the Sanskrit grammarians; under certain restrictions, its presence and development lend flexibility, accuracy and poetic power to a tongue, and thus serves as a criterion of linguistic evolution. This and other suggestive thoughts will be found in the essay.

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SCIENTIFIC NOTES AND NEWS.

MEMBERSHIP OF THE INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY.

An editorial in the *London Saturday Review*, August 1, 1896, makes the following comment

upon the address of M. Berthelot, as President of the International Congress of Applied Chemistry, recently in session in Paris. It is of interest in this country, not only as showing the present attitude of thinking Englishmen in regard to the encouragement of research, but because the reproaches which the English editor showers upon his own country are at least equally applicable in the United States, perhaps more so:

"He was addressing the generals of this new army of science, who, in the rivalries of their nations, count for more than hosts of armed men. England, to defend her vast and scattered interests, attempts to keep her navy equal to the combined navies of any two foreign powers. How in this scientific review did she compare? The figures are so startling and so omnious that we give them all: from Austria, 157; from Germany, 102; from Belgium, 53; from Russia, 37; from Peru, 35; from Portugal, 25; from Brazil, 25; from Mauritius, 24; from Holland, 23; from the United States, 20; from Spain, 19; from Switzerland, 13; from Egypt, 12; from Italy, 10; from England and from Greece, 8; from Roumania, 7; from Cuba, Mexico and the Argentine, 4; from Denmark and Turkey, 1. Repeat it, ponder it! From England, 8; from Austria, 157; from Germany, 102. We will warrant that the Rev. Dr. Lunn got more Englishmen to attend his Swiss Conference on Arbitration! The worst of it is that we have little doubt but that the numbers represent fairly the relative interests in technical chemistry in the different countries, especially if allowance be made for convenience of access to Paris, the place of conference. For the present we cannot enter at length into the causes and possible remedies for this national folly. But we may point out that vast sums are annually wasted on chemistry in England. The Science and Art authorities at South Kensington, and the Technical Instruction authorities of the County Councils, spend largely upon chemical subjects. But, for the most part, the money is spent upon teaching of chemistry, not upon chemical research. It may be a valuable addition to national character that a large number of children be taught the elements of water and the composition of coal gas. But it is an indisputable fact that ninety per cent. of these children do not proceed beyond the luxury of superfluous elementary knowledge; and that of the remaining ten, at least nine become themselves elementary teachers. Teaching is a trade in England; research is not; and, until the endowment of research is recognized as a million times more important than the diffusion of cheap knowledge, England will continue on the downward path."

'SQUIRTING' IRON AND STEEL AND OTHER METALS.

ONE of the most remarkable and unexpected developments in the recent progress of manufactures of metal is described by Mr. Nursey in a paper recently presented, at the Spring Meeting, to the Iron and Steel Institute of Great Britain. This is a process of 'squirting' bars of all the metals in a manner similar in principle to the old and familiar process of manufacture of lead pipe. It is the invention of Mr. Alexander Dick, long known as a practical metallurgist, and especially in the work of introduction of various valuable alloys.

Mr. Dick has discovered a way to make possible the production of all sections of metal bars from the simple round wire to the most complex designs, such as are quite impossible to roll successfully, by raising the metal to be thus formed to a high temperature, and thus to reduce it to the plastic state and then forcing it from a reservoir through properly formed dies under hydraulic pressure. His claim is that it is commercially practicable to form bars of all such sections by 'extrusion under pressure at high temperatures.' The temperature usually adopted by him is approximately 1000° F.

After a long and costly series of experiments, the following system of construction of the apparatus has been found to meet the requirements of the case successfully: A series of concentric cylinders of tungsten steel are placed one within another, separated by an intermediate space of about $\frac{3}{4}$ of an inch; which space is filled with compressed non-conducting material. This 'container' is mounted on trunnions and fitted with a worm-gear arrangement for swinging it in the vertical plane, like a Bessemer Converter. The die plates are made of tung-

sten steel, and their orifices are given the form of the proposed section of the bar to be made. They are carried in a holder which permits their convenient introduction and removal for substitution of one form for another. Before the operation begins, the 'container' is set vertically to receive the charge, and the dies and holder are heated, also, to prevent chilling. Once charged, the container is turned into the horizontal position, and the plunger of a hydraulic press, working under about two tons per square inch pressure, is forced into the container, driving the plastic metal out through the die, from which the bar issues of the desired sectional shape.

The preliminary heating is effected by gas-burners, and the operation of the apparatus keeps up its temperature to the required point until its working hours are over. The apparatus in use at the works of Mr. Dick, the Delta Metal Co., London, has a cylinder of about two feet external diameter and an inner liner five or six inches. The product is about fifty charges per day, and the cost of operation is claimed to be small, the wages of two men and a boy. The metal so produced is claimed to have greatly increased strength, as compared with that made by simple casting, in the usual manner, precisely as 'Whitworth steel' is improved by pressure. Common yellow brass gains about 24 per cent. in tenacity. 'Delta metal' bars thus made are reported to have a tenacity of 48 tons per square inch as against its former strength, 32 tons, and to exhibit a ductility of 32.5 per cent. as against 20 per cent.

Only the copper-tin-zinc alloys and similar metals have, as yet, been treated; but the inventor proposes ultimately to employ the process in the manufacture of iron and steel bars of difficult sections.

THE SANITARY VALUE OF SUNLIGHT.

At the Annual Congress of the British Institute of Public Health, which was held at Glasgow, from July 23d to July 29th, Professor Ramsay, of University College, London, in his address as President of the Chemistry and Engineering Section, dwelt on the sanitary value of sunlight. According to the report in the *British Medical Journal*, he said that the most common evidence of the activity of the violet and ultra-violet rays is sunburn, which is probably due to the effort of the surface cells to protect themselves against these rays by secreting a pigment which can absorb them, and the peeling which accompanies severe sunburn is merely the shedding of such dead cells as have been unable sufficiently to protect themselves. The Röntgen rays are particularly apt to cause the worst kind of sunburn, in one case causing the finger nails of a hand which had been repeatedly subjected to them to come off. Professor Ramsay drew attention to the well-known researches of Professor Marshall Ward, in which he found the violet and ultra-violet rays of the sun, or even of electric light, to be capable of disinfecting the bacilli of typhoid and anthrax. The same subject has now been investigated from the chemical side by Dr. Arthur Richardson. Dr. Richardson determined the circumstances which caused the fading of certain water colors when exposed to light, and examined the action of light on carbon compounds and urine. He found that the effective agent in bringing about the changes which he observed is peroxide of hydrogen. When certain organic materials, such as carbolic acid, and some alcohols, or oxalic acid, are exposed in a damp state to sunlight, hydrogen peroxide is produced. Two quantities of fresh urine were tested for hydrogen peroxide; none was found. One was then exposed for six days to sunlight; the other was kept in the shade. The exposed sample was clear and was found to contain peroxide, while the portion kept in darkness swarmed with bacteria, had grown foul and contained no peroxide. Even after 23 days' exposure to sunlight the one showed no putrefactive change, while the other was entirely putrefied. Similar experiment was made where one sample was shaded with ruby glass, decomposition and absence of peroxide ensuing, while the portion exposed to sunshine was quite unaltered in appearance. Some of the sunned samples, after they had developed a considerable quantity of peroxide, were kept in the shade, but immediately developed fungoid growths, and the peroxide disappeared. Further experiment showed that the presence of oxygen was necessary for

the formation of peroxide in urine. From these results, coupled with those of Dr. Edward Frankland on the development of bacteria at various depths below water, Professor Ramsay regards it as proved that the action of violet and ultra-violet light on organic matter may lead in many cases to the formation of peroxide of hydrogen; that peroxide passes on a portion of its oxygen to the organic matter, thus becoming water and destroying or changing the organic matter; that such changes are destructive to the minute organisms contained in rivers, and generally to animal life, unless the organism is capable of secreting some pigment which excludes violet and ultra-violet light; and that certainly typhoid and anthrax, and probably also other zymotic disease, would be prevented if it were possible to subject the source of infection to sunlight in the presence of moisture.

GENERAL.

JOSEPH DWIGHT WHITNEY, professor of geology in Harvard University, died at noon on August 19th, aged 76 years.

ALBERT NELSON PRENTISS, who since the foundation of Cornell University, in 1868, had occupied the chair of botany, arboriculture and horticulture, died at Ithaca, on August 14th.

FOLLOWING closely on the death of Sir Joseph Prestwich comes the news of the death of Alexander Henry Green, also professor of geology at Oxford. Prof. Green was a student of Cambridge and a fellow of Caius College. He was for many years attached to the geological survey of England and Wales, and later became professor at Leeds, being appointed to the professorship of Oxford in 1888. He died on August 20th, at the age of sixty-four.

THE most recent advices indicate that not only in the north of Japan, but also in Norway and Russia, observations of the recent solar eclipse were made impossible by clouds.

A FIRE broke out on August 18th in the building of the Industrial Exhibition in Montpellier, France, which not only cost considerable injury to the exhibits, but also spread to the university buildings, the damage to the latter being estimated at 600,000 francs.

ACCORDING to the provisions of the will of the late George W. Wales, the Boston Museum of Fine Arts, after the death of his widow, will get $30,000, besides his collection of pottery and glass, and his books on pottery, engraving, glass, lace, painting, architecture and fine arts in general.

DR. A. BALDACCI has undertaken, during the present year, a botanical investigation of northern Epirus, especially the district of Konitza.

DR. NANSEN has contributed to the London *Chronicle* a detailed account of his adventurous exploration, which has been cabled to this country and read by everyone in the daily papers. He states that during the drift of the Fram northward he made careful series of scientific observations, meteorological, magnetic, astronomical and biological, soundings, deep-sea temperatures, examinations for the salinity of the sea water, etc. The sea was not more than ninety fathoms deep south of 79 degrees north, where the depth suddenly increased and was from 1,600 to 1,900 fathoms north of that latitude. This will necessarily upset all previous theories based on a shallow polar basin. The sea bottom was remarbably devoid of organic matter.

DR. HERMANN KRUTZSCH, lately professor of physics and meteorology at the University in Tharandt, died on July 28th, at the age of 77. We also note the death of Dr. L. C. Wiener, professor of mathematics in the High School of Karlsruhe, at the age of 70.

MR. WILFRED WARD, who was Huxley's neighbor at Eastbourne during the latter years of his life, has contributed to *The Nineteenth Century* an interesting account of conversations with Huxley. He is reported to have said: "One thing which weighs with me against pessimism, and tells for a benevolent Author of the universe, is my enjoyment of scenery and music. I do not see how they can have helped in the struggle for existence. They are gratuitous gifts."

THE Editor of *The Astronomical Journal* announces that a few copies of the *Astronomische Nachrichten*, Vols. 100–140 inclusive, forty-one volumes in all, may be obtained from him for $75.00, which is much less than the regular price.

Prof. A. A. Tichomirow has been appointed director of the zoological museum of the University of Moscow, in place of the late Prof. Bogdanov.

The biological station at Plön was closed during the month of July, and has during this period been thoroughly renovated. It is open during August, a month especially favorable for a study of the fauna of the lake. The charge is 10 M. a week for the use of a table.

The committee appointed by the Kazan Physico, Mathematical Society to collect funds for the Lobatchefsky memorial have received 9072 roubles ($7165). *Nature* states that a circular issued by Prof. Vassilief contains the information that the fund has been utilized in the following manner: A capital sum of 6000 roubles has been used to found a prize of 500 roubles to be awarded every three years for a geometrical work, and especially one on non-Euclidian geometry, printed in Russian, French, German, English, Italian or Latin. The first prize will be awarded on November 3, 1897 (the centenary of Lobatchefsky's birth took place on November 3, 1893), and mathematicians competing for it must send in their works not later than November 3d (October 22d). The sum remaining after the foundation of this prize has been devoted to the erection of a bust of Lobatchefsky, in front of Kazan University. The bust will be inaugurated on September 13th of this year, and it is hoped that as many foreign men of science as are able will be present to witness the ceremony.

There will be held at Turin in 1898 a National Exposition at which special arrangements will be made for meetings on medicine and hygiene.

Dr. Geo. Bruce Halsted, professor of mathematics in the University of Texas, is spending the summer in Austro-Hungary and Russia, where he is engaged in mathematical research. His address is Kazan, Russia.

The British Commissioners for the Exhibition of 1851 have made twenty appointments to science research scholarships, for the year 1896, on the recommendation of the authorities of the universities and colleges in which this right is vested. The scholarships are of the value of £150 a year, and are ordinarily tenable for two years in any institution approved by the Commissioners. The scholars are to devote themselves exclusively to study and research in some branch of science, the extension of which is important to the industries of the country.

The University of the Pacific, at its last commencement, conferred the honorary degree of Doctor of Science upon Prof. Edward S. Holden, Director of the Lick Observatory.

Henry C. Ford, President of the Pennsylvania State Fish Commission, died at Philadelphia on the night of August 17th, at the age of sixty.

Since the outbreak of cholera in Egypt this year to August 15th there have been 14,755 deaths.

The agricultural experiment station of the University of Wyoming has issued a first report on the flora of Wyoming by Prof. Aven Nelson, botanist of the station. There are enumerated from the material in the herbarium 1,118 species and varieties of phanerogams representing 393 genera, and 170 more have been reported by other observers. Though the northeast and southwest floras are quite distinct from each other and from those portions of the State which have been the most carefully examined, 1,295 species and varieties have thus far been reported from the State, as compared with 1,460 from Nebraska and 1309 from West Virginia, two of the States that have been most carefully worked over.

The 119th part of the *Flora Brasiliensis*, containing Orchidaceæ III., by A. Cogniaux, has been published in Leipzig. The cost of this extensive work, which was begun in 1840, now amounts to nearly $1,000.

The last number of the *Transactions of the American Institute of Electrical Engineers* contains a report on standards of light by a subcommittee of the Institute consisting of Edward L. Nichols, Clayton H. Sharp and Charles P. Mathews. The committee concludes that of all standards thus far used candles are the least reliable. It seems likely that many of the difficulties that are unavoidable with flame standards may be overcome by the adoption of a standard consisting of some surface electrically

heated to a standard temperature. The definition of the degree of incandescence of such a surface appears at the present almost insuperable, but the committee is at work upon a method for the measurement of the temperatures of incandescent carbon, which may lead to results looking towards the solution of the problem. It also has in progress experiments looking to the production of a light standard in which not only the burning material, but also the atmosphere, shall be of known and definite chemical composition.

PROF. E. B. TITCHENER, of Cornell University, will translate into English Wundt's *Physiologische Psychologie* and, in coöperation with Mr. W. B. Pillsbury, Külpe's *Einleitung in der Philosophie.* Miss Julia H. Gulliver, of Rockford College, will translate Wundt's *Ethik.* WUNDT'S *Lectures on Human and Animal Psychology* and Külpe's *Outlines of Psychology* have already been translated into English by Prof. Titchener, the former in coöperation with Prof. Creighton, and his *Introduction to Psychology* is being translated by Dr. Judd. Consequently, after a too long delay, we shall have adequate English versions of Wundt's contributions to psychology, including those of one of his most prominent pupils, Prof. Külpe.

THE Chicago Academy of Sciences gave, from July 15th to August 15th, a free course of lectures by twenty-five different lecturers, the subjects included being Anatomy, Climatology, Optics, Geology, Astronomy, Physics of Electricity, Botany, Zoology, Entomology, Comparative Anatomy, Mental Science, Biology, Physiology, Malacology, Physical Geography, Surgical Anatomy, Physics of Optics, Bacteriology, Ornithology, Scientific Nursing, Latin, German, Anthropology, Chemistry, Surgical Philosophy, Medical Chemistry, Hygiene and Meteorology. Meteorology was demonstrated at the Auditorium Tower every Saturday afternoon from 2 to 4 o'clock by Prof. E. B. Garriott.

THERE has been established in Berlin a People's Society for Natural Science, the chief object of which is to offer scientific lectures that will be interesting to those having no technical knowledge of the subject. The first lecture before the Society was given by Dr. Förster, Director of the Royal Observatory, and was entitled 'Conditions and beginnings of life on the earth.'

A CASE reported in *The British Medical Journal* may be of interest to American as well as English municipal authorities. The executors of the late Mr. T. H. Smith, of Moseley, near Birmingham, claimed, on behalf of his widow and six children, the sum of £10,000 damages from the King's Norton Rural District Council for negligence, which, it was alleged, caused the death of Mr. Smith from typhoid fever. It was stated that a ventilating shaft communicating with a chimney in the house of the deceased allowed sewer gas to be conveyed into the rooms. In 1891 the Council undertook to disconnect the shaft, but after Mr. Smith's death inquiry was made, with the result, it was alleged that a defect was found to exist which, still permitted the escape of sewer gas into the house. The jury gave a verdict for the plaintiff, with £3,500 damages.

WE learn from the New York *Evening Post* that, beginning with August 28th, the usual series of horticultural schools under the direction of the professors at Cornell will be conducted throughout western New York. Twenty-six schools have been definitely arranged for, to be in the charge of three distinct sets of teachers, having at their heads respectively Prof. L. H. Bailey, who travelled 15,000 miles back and forth through the State in carrying out this work last year; George T. Powell, of Ghent, and Prof. E. G. Lodeman.

UNIVERSITY AND EDUCATIONAL NEWS.

THE University of Pennsylvania will proceed at once with the erection of a new building for the department of dentistry, to cost $120,000.

GROUND has been broken for the new library at Princeton University. The building is to be 200 x 180 feet in ground measurements, and will be four stories high. The estimated cost is $598.000.

THE London University Bill, which it was hoped to pass through Parliament before its adjournment, has been abandoned, owing to the