in physics; Gaston Planté prize (3000 francs), for the French author of an important discovery, invention, or work in the field of electricity.

Chemistry.—Jecker prize (10,000 francs), for work conducing to the progress of organic chemistry; Cahours prize (3000 francs), for the encouragement of young chemists; Montyon prize (unhealthy trades; one prize, 2500 francs, a mention of 1500 francs), for the discovery of a means of rendering an art or trade less unhealthy; Houzeau prize (700 francs), for a young chemist.

Mineralogy and Geology.—Delesse prize (1400 francs), for work in geology, or, failing that, in mineralogy; Joseph Labbé prize (1000 francs), for geological researches contributing to the development of the mineral wealth of France, its colonies, and protectorates.

Botany.—Desmazières prize (1600 francs), for the best publication during the year on Cryptogams; Montagne prize (1500 francs), for work on the anatomy, physiology, development, or description of the lower Cryptogams; de Coincy prize (900 francs), for a work on phanerogams; Thore prize (200 francs), for work on the cellular cryptogams of Europe; Jean de Rufz de Lavison prize (500 francs), for work on plant physiology.

Anatomy and Zoology.—Savigny prize (1500 francs), for the assistance of young travelling zoologists, not receiving Government assistance, who work on the invertebrates of Egypt and Syria; Cuvier prize (1500 francs), for work in zoological palæontology, comparative anatomy, or zoology; da Gama Machado prize (1200 francs), for memoirs on the coloured parts of the tegumentary system of animals.

Medicine and Surgery.—Montyon prize (2500 francs, mentions of 1500 francs), for discoveries or inventions in medicine and surgery; Barbier prize (2000 francs), for a discovery in botany in relation to medicine, or in the sciences of surgery, medicine, or pharmacy; Bréant prize (100,000 francs), for a specific cure for Asiatic cholera; Godard prize (1000 francs), for the best memoir on the anatomy, physiology, and pathology of the genito-urinary organs; Baron Lorrey prize (750 francs), for a work treating of military hygiene, medicine, or surgery; Bellion prize (1400 francs), for medical discoveries; Mège prize (10,000 francs); Argut prize (1200 francs), for the discovery of a remedy for a disease at present not capable of treatment; Chaussier prize (10,000 francs), for the best book or memoir published during the last four years on legal or practical medicine; Dusgate prize (2500 francs), for a work on the signs of death and the means of preventing premature burial.

Physiology.—Montyon prize (750 francs), for work in experimental physiology; Philipeaux prize (900 francs), for experimental physiology; Lallemand prize (1800 francs), for work relating to the nervous system; Pourat prize (1000 francs), for a memoir on the relations between the combined sugar of the blood and the albuminoid materials.

Statistics.—Montyon prize (1000 francs, and two mentions of 500 francs), for works dealing with statistical questions.

History of Science.—Binoux prize (2000 francs).

General Prizes.—Arago medal; Lavoisier medal, for work in chemistry; Berthelot medal, to persons taking prizes in chemistry or physics; Henri Becquerel prize (3000 francs); Gegner prize (3800 francs); Lannelongue prize (2000 francs); Gustave Roux prize (1000 francs), Tremont prize (1100 francs); Wilde prize (4000 francs), for a work or discovery in astronomy, physics, chemistry, mineralogy, geology, or experimental mechanics; Lonchampt prize (4000 francs); Saintour prize (3000 francs), for work in mathematics; Henri de Parville prize (2500 francs); Victor Raulin prize (1500 francs), for facilitating the publication of works relating to geology and palæontology; Vaillant prize (4000 francs), for the discovery of a photographic plate free from grain, and as sensitive as the gelatino-bromide in current use; Fanny Emden prize (3000 francs), for work dealing with hypnotism and suggestion; Grand prize of the physical sciences (300 francs), for the study of a French colony from the point of view of its geology, mineralogy, and its physical geography; Leconte prize (50,000 francs), for new and important discoveries in mathematics, physics, chemistry, natural history, and medical science; Petit d'Ormoy prize (10,000 francs), for work in pure or applied mathematics or in natural science; Pierson-Perrin prize (5000 francs), for a discovery in the field of mechanics or physics.

THE ASSOCIATION OF ECONOMIC BIOLOGISTS.

THE twelfth annual Congress of the Association of Economic Biologists, held at the Liverpool School of Tropical Medicine, last week, marked off a distinct era in the progress and development of economic biology in the United Kingdom.

Founded in November, 1904, with a membership of twenty-four, it seemed doubtful for a time whether what Prof. Fred V. Theobald aptly christened "Mr. Collinge's healthy infant," would weather the storms of its early days. At that time economic biology was looked askance at in all our universities, and regarded as something ultra-scientific, and could only be said to be taught and studied in any detail at the South-Eastern Agricultural College, Wye.

Even at a later date professors of biology were interested only in the morphological or systematical aspects of biology, and dreaded the intrusion of applied biology. Happily these views have all passed away, and the association may very rightly claim to have had a large share in bringing about a more reasonable and truly scientific spirit.

Meeting first in the University of Birmingham, the association has held meetings in the Universities of Liverpool, Cambridge, London, Edinburgh, Oxford, Manchester, and Dublin. From each of these centres of learning it has gathered strength, leaving behind some record of the really valuable work which its members have been engaged upon, and indirectly tending to gain the sympathies of those who originally regarded the organisation from an entirely mistaken point of view. Gradually biologists in this country were beginning to realise that, as stated by Prof. Miall, "a practical purpose is, in my opinion, not a hindrance but a powerful motive to the acquisition of scientific knowledge. If not too narrowly prosecuted, the practical purpose may be a means of distinguishing knowledge, which is really useful from knowledge which is merely curious."

Since 1904 departments of economic biology have been founded in nearly all our universities, which has meant an increase in the number of workers, and has made the association still more necessary for such investigators to possess an organisation wherein they could "discuss new discoveries, exchange experiences, carefully consider the best methods of work, give opportunity to individual workers of announcing proposed investigations, so as to bring out suggestions and prevent unnecessary duplication of work, and to suggest, when possible, certain lines of investigation upon subjects of general interest."

The outstanding feature of the Liverpool meeting was the decision of the council to increase the number of meetings to four per annum, three of which will be held in London, and one in the provinces; coupled

with this it was gratifying to note the large number of new members, particularly so of those working in connection with the Board of Agriculture and Fisheries, and in the newly established university departments.

It is hoped that with the increase in the number of meetings there will be a still further increase in the membership, and that the association will take its position amongst the numerous other learned societies, thoroughly representative of all branches of applied biology.

To a very much larger extent than hitherto, the association will in the future play no unimportant part in defining the scope of economic studies in biology, and having now definitely taken up its headquarters in London, it will be more in touch with Governmental departments. Representative as its membership is of the universities of the country, and not a few of our Colonial departments, the possibilities that lie before it are endless, and should exercise a very profound influence upon the future of economic biology in this country, tending to raise its status to the level it occupies in other countries, and to become still more beneficial to the people of this country and its great Colonial Empire. W. E. C.

FATIGUE AND EDUCATIONAL WORK.

THE London County Council's annual Conference of Teachers, held last week, yielded some notable pronouncements. On the opening day, January 1, Canon Masterman laid stress upon the training in morals and in imagination which pupils gain when history is properly taught. History provides an education in sympathy not only with our forefathers, but with "the brotherhood that binds the brave of all the earth." The true historian always cares supremely for the truth; the critical faculty of the pupil must be carefully trained. To the great deed they must offer their admiration, their gratitude if they could, and, if not, then their silence. The historian differs from the antiquary in his constant thought of the present; the boy who rides in imagination with the knight to the *Parliamentum* at Westminster will have a clearer idea of the responsibility of citizenship. The pageantry of history is sacramental; it has an inward and spiritual import, and, unless the teacher feel something of the spiritual significance of history, he had better teach algebra or mechanics all his life.

On the second day, Mr. W. H. Winch gave the results which had attended a few experiments he had made in testing the fatigue of adolescents who were in attendance at evening continuation schools. He pointed out that his experiments in connection with the fatigue of day-school pupils had yielded no satisfactory result, while he had found distinct evidence of fatigue in adolescents who continued their education in the evenings. His experiments indicate that, in the cases he examined, adolescent students suffered a loss of ability as the period of instruction drew to a close. He instanced six sets of experiments, and in the only case which did not show the results of fatigue subsequent inquiry showed that 75 per cent. of the students were not occupied during the daytime. From such evidence he concluded that evening continuation schools were not places of serious continued education for adolescents; they were a waste of educational appliances. The chairman, Dr. W. McDougall, Wilde reader in mental philosophy, thought these conclusions somewhat premature, as it did not follow that work which caused a measurable amount of fatigue was work which should, therefore, not have been undertaken.

Mr. T. H. Pear described an experiment in connection with the fatigue which ensues from loss of sleep in which it was demonstrated that the fatigue persisted long after the subject was of opinion that the effects of the lack of sleep had disappeared. He suggested that, on account of fatigue, the teacher who energetically changed from a strenuous lesson on one subject to a lesson of equal strain on another subject lost efficiency; the early lesson caused fatigue, and should have been followed by a period for recuperation.

The conference closed with a description of six educational experiments; it was announced, as evidence of the wide latitude for experiment allowed in the elementary schools, that no fewer than sixty descriptions of such experiments had been offered for the consideration of the conference.

ENGINEERING AT THE BRITISH ASSOCIATION.

THE Engineering Section of the British Association met under the presidency of Prof. Gisbert Kapp, who took for the subject of his address the electrification of railways. The address, which was printed in full in NATURE of October 9 (p. 184), was followed by an interim report of the committee on gaseous explosions, which very briefly chronicled the work accomplished during the year, and described the steps which are being taken to carry on further research work at the Imperial College of Science. One of the notes presented to this committee was also read by the authors, Profs. Petavel and Asakawa, and described some experiments on the effect upon gas-engine efficiency of varying compression ratio. In these experiments the brake-horse-power increased in the same proportion as the theoretical air efficiency, but the mechanical efficiency decreased as the compression ratio increased.

The concluding paper of the first meeting was read by Prof. Burstall on solid, liquid, and gaseous fuel, in which he discussed the various advantages obtained from each kind of fuel, and outlined a scheme for utilising, to the best advantage, a large daily supply of coal at the pit mouth by the production of coke, fuel gas, sulphate of ammonia, and various by-products of the tar obtained from the retorts.

The first paper on the Friday morning dealt with the application of the internal-combustion engine to railway locomotion, and described a bogie-coach of 60 ft. in length propelled by two six-cylinder Daimler engines through the medium of gears affording six-speed ratios. Recent trials demonstrate the feasibility of maintaining a high speed over long distances at a reasonable cost, and the author, Mr. F. W. Lanchester, advocated the running of such vehicles on main lines at frequent intervals as much more economical and satisfactory than a service of long trains at considerable intervals. In the paper which followed, Dr. Hele-Shaw described a new type of hydraulic weighing-machine of the piston type, in which packings are dispensed with, while friction and leakage are practically eliminated by ingenious mechanical devices.

The propulsion of barges on canals by aërial propellers was described by Mr. L. B. Desbleds, and although the possible efficiency of this system of propulsion was shown to be very small, the author considered there was a limited field for its application in cases where submerged propellers could not be employed.

Mr. Lanchester directed attention to the various factors which cause instability in aëroplanes, and with the aid of models demonstrated the important features