is the reason why so many dyed kippers are on the market: dyed herrings can be smoked in 5-6 hours.

Work has been continued on the gas-storage of apples in the experimental stores at the Ditton Laboratory. At present, control over the composition of the atmosphere is obtained by regulated ventilation with fresh air, but there is now some evidence that a closer control over the percentages of oxygen and carbon dioxide in the store may be required in the case of certain varieties. Experiments have also been carried out on the gas storage of pears and bananas and the cold storage of potatoes. J. Barker has found that between +3° and −1° C. there is a great increase in the amount of sugar found in the potato after sixty days' storage, the concentration being inversely proportional to the temperature. The sweetening is attributed to a change in the organisation of the protoplasm. It was also found that transference from a low temperature to 15° C. for a period of only twenty-four hours completely arrested any further increase in the sugar content in the cold store.

Most fruits and vegetables undergo autolytic changes when hard frozen, even at −20° C., the only exception so far observed being raspberries. On thawing such frozen raspberries, colour and flavour were perfect and the texture was scarcely altered. Blanching will permanently inhibit these changes: after blanching, peas, runner beans, and potatoes can be frozen, and on thawing again are superior to the canned vegetables. Strawberries can be frozen in syrup at −20° C., and the thawed fruit is suitable for fruit salads, etc. Plums and cherries, treated similarly, turn brown on thawing; they can, however, be frozen after blanching.

Work has been continued on the corrosion of iron and tin. It has been found that ferrous salts accelerate the corrosion of tin in the presence of air by acting as carriers of oxygen. Ferric salts accelerate the corrosion of iron in the presence of air over the range of hydrogen ion concentration likely to be met with in the canning of fruit, the combined effect of air and the ferric iron being much greater than that of either of them alone, especially at a hydrogen ion concentration of about *p*H 4. Further work has also been carried out on the engineering and physical problems of the maintenance of temperature and composition of the atmosphere in stores such as ships' holds. In the storage of fruit, the metabolism of the fruit itself affects both the temperature and atmosphere of the store, and complicates the problem of maintaining a constant environment.

International Astronomical Union

THE fourth general meeting of the International Astronomical Union, attended by representatives of twenty-four countries, was held at Cambridge, Massachusetts, on Sept. 2–9, under the presidency of Sir Frank Dyson. At the opening session the Union was welcomed by the Hon. C. F. Adams, Secretary for the Navy in the United States cabinet, and by Dean Bernice Brown, head of Radcliffe College. The members of the Union were for the most part accommodated in the dormitories of the College, a very convenient arrangement giving every opportunity for the informal discussions in small groups which add so much to the real value of the meeting. The full meetings were held in the Alice Longfellow Hall of Radcliffe College, and the commissions met in the various lecture rooms. All the arrangements for the meeting were made with a thoroughness and completeness, which it would be difficult to equal, by a local committee with Prof. Harlow Shapley as chairman and Mr. L. B. Andrewes, following the late Miss Adelaide Ames, as secretary.

The formal work of the Union lay in the sessions, reports and resolutions of twenty-seven committees: these dealt with such subjects as meridian astronomy, planetary observations, *Bureau International de l'Heure*, variation of latitude, *Carte du Ciel*, stellar parallaxes, variable stars, stellar spectra —to mention only a few of them. The volume of draft reports is nearly two hundred pages long and can scarcely be summarised here, but reference may be made to the reports on solar physics, by Dr. St. John, on standard wave-lengths by Prof. A. Fowler, on stellar photometry by Dr. Seares, on radial velocities by Dr. J. S. Plaskett, and on the observations of Eros for solar parallax, by Dr. Spencer Jones.

Among resolutions passed by the General Assembly were the following: The equinox of 1900·0 was adopted for catalogues other than catalogues of precision, by agreement among the various groups of astronomers interested in the question. A proposal to fill a gap existing in astronomical bibliography between 1880 and 1899 was approved. A proposal to establish the vertical circle of the Pulkovo Observatory in as nearly equal a southern latitude as possible in the hope of improving fundamental declinations, met with much sympathy and full approval. A number of recommendations adopting fresh standard wave-lengths and urging further work on the subject was adopted. The printing of a list of designations for lunar formations was approved. Further exploration of the meteor craters in North Africa and Siberia was urged, also an extension of the meteor work now being carried on in Arizona. A resolution from the commission on radial velocities earnestly commending any project for obtaining urgently needed data in the southern sky, and welcoming the possibility of establishing a large reflector in South Africa in the event of the transfer of the Radcliffe Observatory, was passed unanimously by the General Assembly. Financial help was granted towards the printing of further volumes of the *Carte du Ciel*. Other grants were continued mostly at a reduced figure, and a new grant was made toward the reduction of the Eros observations.

On the proposal of the finance committee the unit of subscription from the adhering countries was lowered. It was hoped that this might check any further secessions of countries on financial grounds, Australia and South Africa having resigned on that score. Two new countries—India and the Vatican State—were reported as adhering since the last General Assembly, while Roumania had become a fully subscribing member of the Union. As in the number of countries adhering, so also in the numbers of commissions there were changes. The commission on dynamical astronomy was abolished at its own request, while new commissions on 'Selected Areas' and spectrophotometry were formed. The solar commission broke up once more into its earlier constituent parts in the form of commissions on sunspots, chromospheric phenomena, solar spectroscopy and radiation and eclipses.

In addition to the technical discussions and the international organisation in the commissions there was an interesting visit to the Harvard College Observatory and to its new station at Oak Ridge for a 61-inch reflector; later a demonstration was given of eclipse results so far as they could be announced. Good results may be expected apparently from chromospheric spectra obtained by the falling plate method by the Lick observers, and a very nice flash was secured by the Greenwich observers—the only British expedition in Canada which had any luck at all. Nice pictures of the corona were secured by a number of expeditions, notably the Lick party which also at last obtained some interference fringes from the coronal line. Good polarisation results are hoped for from the French and the Harvard expeditions. Amongst other interesting slides shown at the meeting were the coronal spectrograms and photographs secured by M. Lyot, of the Paris-Meudon Observatory, without the aid of an eclipse.

The next meeting of the General Assembly was fixed for 1935 (probably early July) in Paris on the invitation of the French astronomers. The newly elected executive committee to serve until then consists of Prof. F. Schlesinger (United States), *President;* Prof. T. Banachiewicz (Poland), Prof. E. Bianchi (Italy), Prof. C. Fabry (France), Prof. N. E. Norlund (Denmark), Prof. F. Nušl (Czechoslovakia), *Vice-Presidents;* Prof. F. J. M. Stratton (Great Britain), *General Secretary.*

Recent Researches on Cosmic Rays

IN the *Times* of October 8, Prof. A. Piccard gives an account of his experiments on the cosmic rays during his balloon ascent on August 10, in which he was accompanied by Max Cosyns, and reached a maximum height of 53,672 feet. Two distinct types of observations on the cosmic rays were made on this occasion, one to determine the variation of intensity of the rays with height, and the other to determine the distribution of the radiation in different directions.

The observations on the change of intensity were apparently made in the usual way by measuring the ionisation produced in a sealed vessel. Prof. Piccard states that his results over the same range of height are in good agreement with those found by Prof. Regener, of which an account was given in a letter published in NATURE of September 3. It will be recalled that in Regener's experiments, self-registering apparatus was attached to a free balloon which reached a much greater height than Piccard's balloon. He found that the intensity of the radiation increased rapidly at first with altitude, then more slowly, and finally reached what appeared to be a constant maximum at the greatest heights. The free balloon of Regener rose to a point where the barometric pressure was about 25 mm., while the lowest pressure reached by Piccard was 73 mm. The concordant results obtained by the two observers thus give us new and valuable information of the apparent variation of intensity of the rays up to the highest altitudes that are likely to be reached for some time to come.

The second type of experiment made by Piccard was to determine the direction of the cosmic rays by using a tubular Geiger counter. This device has the property of distinguishing to some extent between rays coming from different directions. At the earth's surface it can be shown with this apparatus that the rays come predominantly downwards. In striking contrast to this, Piccard finds no such directional effect at high altitudes, and thus concludes that the radiation at such great heights is uniform in all directions. He provisionally suggests that the cosmic rays have their origin in the stratosphere. He is, however, careful to point out that this is not the only possible explanation. For example, little if any directional effect would be expected if the rays were actually cosmic in origin and fell on the earth uniformly in all directions. Whatever may be the ultimate interpretation of these observations, they constitute an important contribution to our knowledge.

A vigorous attack on the problem of the nature of the cosmic rays is now being made by several new and powerful methods. The experiments of Regener and Piccard afford trustworthy information of the variation of intensity of the rays with altitude, while the work of many experimenters has given us accurate data of the absorption of the radiation for great depths of water and for other absorbing material. The earlier observations of Millikan had indicated that the intensity varied little if at all on the earth's surface. This important question has been again examined by Prof. A. H. Compton during the past year in the course of his travels in the northern and southern hemispheres. He made observations of the relative intensity of the cosmic rays by the ordinary ionisation method. He concludes that there is a marked change of intensity at different parts of the earth, especially