records room and ladies' rest rooms, whilst the second floor contains a small classroom and various store rooms.

The new building runs on from the house to give a total frontage of 151 ft. 6 in., with a mean depth of 50 ft. It consists of Section A, separated by a second entrance hall from Section B. In addition, Section C runs off to form the limb of a letter L and contains the heavier practical equipment. Section A contains on the ground floor a central corridor opening into rooms on either side. These comprise the following: general office, refectory and kitchen, in which good use is made of glass for tiling and table tops, mechanics' shop, drawing office, and laboratories for the study of optical radiation and X-ray, mechanical and thermal properties, with a small dark room. On the same floor, Section B contains students' cloakrooms, a general physical and a high-temperature laboratory, and store rooms for apparatus and materials. On the first floor, the whole of Section A is taken up by a museum 60 ft. long and 31 ft. wide on one side, whilst the remaining space comprises a small lecture room, museum keeper's store, and a decorative processes laboratory. Outside the museum in Section B is the landing, with office, leading to the lecture theatre and preparation room. The theatre seats approximately one hundred and has a projection gallery, dimming device, and the usual services. On the second floor are the two laboratories, students and research, for work of a chemical nature, and two smaller rooms which are equipped for special branches of research. There are also an office and store rooms and the projection room on this floor. A lift connects all floors with the basement, where the following are located: meter room and pipe duct, boiler room, battery room, dynamo room, and various store rooms.

Section C, only half of which is at present erected, is to have a length of 75 ft. It now consists of three rooms, one of which is built over an archway and is devoted to raw materials and mixing, whilst of the other two, 50 ft. by 36 ft., that on the ground floor is used for the storage, preparation and testing of refractories, two small laboratories being partitioned off for the latter purpose. The remaining room on the first floor is given over to glass melting and is equipped with a variety of furnaces, gas and electrically heated. Provision has been made for the building of large furnaces, and an adjustable stage has been built below an opening in the floor to accommodate regenerator or recuperator structures without taking up too much of the space in the refractories section below.

Throughout the building glass has been used as much as possible and Vitrolite, glass bricks, Thermolux and armour-plate glass, together with glass silk insulation have been effectively employed. Special mention may be made of the large glass dome over the stairway, the glass panels in the latter, the various stained glass windows, and the window to be erected in the museum depicting "Glassmaking through the Centuries".

The Royal Society and the Kaiser Wilhelm Gesellschaft

Exchange of Visits

IN the autumn of 1938, following a suggestion of the president of the Kaiser Wilhelm Gesellschaft, arrangements were made by the president of the Royal Society of London, Sir William Bragg, and representatives of the Kaiser Wilhelm Gesellschaft, for an exchange of visits between these two bodies. The Kaiser Wilhelm Gesellschaft, founded in 1911 at the suggestion of the Kaiser Wilhelm II, has as its aim the encouragement of the natural and human sciences, primarily by establishing and maintaining research institutes for natural science in Germany.

This exchange of visits was welcomed by the Royal Society, which, since its foundation in 1662, has always sought to maintain, irrespective of race or politics, the liveliest interest in the work of men of science throughout the world. Consequently, arrangements were made for two fellows of the Society, Prof. F. G. Donnan, emeritus professor of chemistry in the University of London, and Prof. A. J. Clark, professor of materia medica in the University of Edinburgh, to visit Germany in March; at the express wish of the Kaiser Wilhelm Gesellschaft for a lecture on a non-scientific subject, Prof. Dover Wilson, the eminent Shakespearean scholar, was invited by the Royal Society to visit Berlin to lecture. The visits, which took place in March and April, were highly successful. The visitors were most hospitably entertained by their German colleagues and were afforded facilities for visiting laboratories and research institutes.

The Royal Society is entertaining during this month four German men of science. They are Freiherr von Verschuer, of the University of Frankfort-on-Main, Prof. R. Kuhn, of the Kaiser Wilhelm Institut für Medizinische Forschung, Heidelberg, Prof. F. Wever, of the Kaiser Wilhelm Institut für Eisensforschung Forschung, Düsseldorf, and Prof. Otto Hahn, of the Kaiser Wilhelm Institut für Chemie, Berlin-Dahlem. Freiherr von Verschuer and Prof. Kuhn delivered lectures before the Royal Society on June 8 and 9 respectively; Prof. Wever will speak at the Royal Society on June 22 at 4.30 on metallurgical research, and Prof. Hahn at the Royal Institution on June 23 at 2.30 on the fission of uranium nuclei by neutrons.

RESEARCH IN TWINS

The first exchange lecture between the Kaiser Wilhelm Gesellschaft and the Royal Society was given on June 8 by Freiherr von Verschuer, professor of human genetics and eugenics at the University of Frankfort-on-Main. This institution has devoted itself especially to the study of twins and the subject of the lecture was twin research.

Prof. Verschuer pointed out that Galton in 1875 was the first to recognize the importance of the study of inheritance in twins, distinguishing between monozygotic or identical, and dizygotic or fraternal, twins. The twin method dissociates the parts played

by heredity and environment in the development of the individual. A resemblance diagnosis has been established for determining the identity of similar sexed twins, and every case of identical twins is confirmed by identity of the blood groups. Examination of the after-birth of many twin births shows that identical pairs may have one chorion or two. Hair colour and eye colour are useful characters in diagnosing twins among Europeans, but not among Mongolian or African peoples, where these features do not vary appreciably. Identical twins are genetically identical persons, so that even skin transplantation can take place between them. All differences between such twins are therefore non-hereditary.

In a considerable study of tuberculous twins, extending over ten years, striking evidence has been obtained of the existence of an inherited disposition to tuberculosis. In several cases identical twins living for many years under very different conditions nevertheless sickened and died of the same form of the disease at almost the same time. In identical twins the number of concordant reactions to tuberculosis is very high compared with that of ordinary twins.

Inheritance in relation to numerous other diseases is being studied by recording all the twins in a given district and period, or by examining the twins among all the patients at certain clinics who are suffering from a particular disease.

CHEMICAL BASES OF THE BIOLOGICAL ACTIONS OF LIGHT

The second exchange lecture was delivered on June 9 by Prof. R. Kuhn, of the Kaiser Wilhelm Institut für Medizinische Forschung, Heidelberg, and president of the German Chemical Society. Prof. Kuhn said that the elucidation of the mechanism of the many living processes in which light is concerned involves the application of well-established photochemical principles and experimental technique. As only light which is absorbed can cause a photochemical change (Grotthus-Draper law) one first looks for a photosensitive substance which absorbs light of the active wave-length. The correlation can often be confirmed by comparing quantitatively the 'action' (photosensitivity) curve with the extinction coefficient curve of the absorbing substance. In many cases the photosensitive substance is present in such minute amounts that careful extraction in the dark from a very large bulk of material is necessary in order to find it.

It is possible to make generalizations as to the types of organic structure which will lead to absorption in a certain part of the spectrum such as the visible. There are, of course, many examples of these types found in plants and animals. Furthermore, associated with these organic structures, there are certain types of photochemical change, such as *cis-trans* transformations, shifts of the double-bond position, ring breaking, and production of free radicals.

It is a familiar fact that the higher green plants grow towards the light. The 'action' curve has recently been found to correspond to the absorption curve of carotine. The latter apparently photosensitizes the conversion of auxine-*a*, a growth-promoting substance, into an inactive lactone compound. On the sunny side of a plant the cell growth is therefore inhibited, while on the shady side it is not, hence the turning towards the light.

Gametes of *Chlamydomonus eugametos* in the light liberate a substance which sensitizes their copulation. This substance is found in high concentration in the stigma of *Crocus sativus* and is called crocin. The gametes are extremely sensitive to this substance, 0·4 mgm. in 10^{11} cm.^{3} being sufficient to activate them when their concentration is 2×10^6 per cm.^{3}. As the molecular weight of crocin is 978, this corresponds to one molecule per gamete. A concentration a hundred times stronger is necessary before fusion between males and females takes place, but such a concentration is still far below the limits of detecting this highly absorbing substance by means of the eye. The specificity for the male and female species has been correlated with the *cis* and *trans* forms.

In fishes, the liberation in the dark of a light-sensitive substance, 1,2,3,4,5,6,8 heptahydroxy, 7-ethyl-naphthalene, by the ripe eggs chemotactically attracts the spermatozoa.

The photo-activity of human skin was studied by projecting the spectrum of a carbon arc on a test area for four minutes. The usual erythema maximum at 300 mμ was found to develop after four hours, but a marked browning with maxima at 360, 380 and 408 mμ developed in a much shorter time. The erythema at 300 mμ disappeared in a few weeks, while that at longer wave-lengths persisted for some months. In a similar manner the 'action' curve of the ripening of a green banana skin was studied, and it was found to follow closely the absorption spectrum of chlorophyll.

Photosensitive substances, particularly visual purple, play a fundamental part in vision. The 'action' curve, that is, the luminosity curve, of scotopic vision follows closely the absorption spectrum of visual purple. A new colouring substance, astaxanthin, coupled to a protein, has been isolated from hens' eyes, and certain coincidences between its behaviour and phenomena occurring with colour vision may mean that it is associated with this visual process.

The S.S. *British Queen*

A CENTURY ago, no journal displayed more interest in the progress of trans-Atlantic steam navigation than the *Athenæum*; and in its issue of June 22, 1839, it referred at length to the *British Queen*, which was built at the same time as the *Great Western*, but the completion of which had been seriously delayed. In June 1839, the *British Queen* was still in the Clyde, having her machinery fitted by Robert Napier, and the *Athenæum* said: "The completion of this vessel is looked forward to with much anxiety by all who take an interest in the improvement and extension of steam navigation and all who desire the peaceful and reciprocally beneficial intercourse of civilised nations. She will be most certainly a great experiment, in the theory of steam navigation, on many interesting points."