of investigation have been the effects of the addition of free acids and foreign salts on the absorption spectra. A notable result is the discovery of well-defined "solvent bands" for various substances, for example, water, alcohols, acetone, glycerol, which do not show any appreciable absorption of visible light.

In general it is shown that the *anions* of the various coloured salts play a much less important *rôle* in modifying the spectra than the solvent. Different salts of the same anion in the same solvent usually have the same absorption spectra. As, however, the absorption spectra of the powdered salts may be very different, it is evident that the solvent has an important part in the mechanism of absorption.

On the other hand, the absorption spectra of the same salt in different solvents are often very different; Jones and Anderson have ascribed this to the formation of *solvates*, more or less stable compounds of the salt and solvent. The persistence of solvent bands varies quite widely for the different solvents, appearing to be greatest for water and less for the alcohols.

Some of the uranous salts in the various solvents, water, alcohols, acetone, and glycerol, show characteristic bands very strongly. An attempt is being made to correlate many of these well-defined phenomena with the results of the Zeeman effect on similar variations of the salts and solutions, and it is considered that the results of such investigations may lead to a much clearer knowledge of the chemistry of compounds. In some cases it is possible to break up the absorption bands into very fine bands by chemical methods, as has been done with uranyl and uranous salts in acetone solutions, the most marked example being the action of hydrochloric acid on an acetone solution of uranous chloride.

A very noticeable result is the action of free acids on the corresponding uranyl salt, *e.g.* acetic acid on the acetate, nitric acid on the nitrate, &c. In most of these cases the presence of these foreign reagents causes the uranyl bands to become more intense, and, in most cases, narrower. The action of all except nitric acid is to cause the uranyl bands to be shifted towards the red. Nitric acid, on the contrary, produces large shifts towards the violet. A very important result of this analysis is that the absorption bands gradually shift as one salt of a metal is transformed into another by the addition of free acid. This is interpreted to mean that a series of intermediate products are formed, each with its characteristic absorption spectrum, although the chemical methods at present at our disposal do not enable us to isolate them.

It is also shown that rise in temperature causes the general absorption of any salt in water to increase, and the bands to broaden and become more intense.

The authors summarise the discussion as to the bearing of this work on the solvate theory of solution.

An excellent series of ninety-eight photographic reproductions of the spectra is included in the volume.

C. P. B.

THE ROYAL SOCIETY CONVERSAZIONE.

THE ladies' conversazione of the Royal Society was held at the rooms of the society in Burlington House on Wednesday, June 14. Many objects and experiments of scientific interest were on view, but most of them were described in our account of exhibits at the previous conversazione on May 10 (NATURE, May 18, p. 394). It is unnecessary, therefore, to refer to these again. Among other exhibits at last week's function were those described in the subjoined summary of the official catalogue.

The Director, Khedivial Observatory, Helwan, Egypt.—Photographs of Halley's comet, taken with the 30-inch Reynolds reflector by Mr. H. Knox Shaw. The photographs exhibited cover the period from April 16, 1910, to June 10, 1910. *Royal Astronomical Society.*—Photographs of the planet Mars, taken by Prof. E. E. Barnard with the 40-inch telescope of the Yerkes Observatory. The photographs of September 24, 1909, show the region of the Fastigium Aryn and Margaritifer Sinus, and those of September 28 the region of the Syrtis Major.

The Director, Royal Botanic Gardens, Kew.—(1) Collection of Euphorbias, showing mimetic resemblance. The following species of Euphorbia, selected from the collections at the Royal Botanic Gardens, Kew, show remarkable resemblance in habit to plants of other natural orders to which they are in no way related botanically. The species of Euphorbia, together with the plants they resemble, were exhibited side by side.

(1)	*Euphorbia Bertheloti*	*Cotyledon lineolare.*
(2)	,, *colletioides*	*Rhipsalis micrantha.*
(3)	,, *dendroides*	Willow twigs.
(4)	,, *hystrix*	*Cereus insularis.*
(5)	,, *Intisy*	Prunus twigs.
(6)	,, *polygona*	*Cereus polygonus.*
(7)	,, *Schimperiana*	*Ceropegia fusca.*
(8)	,, *Sipolisii*	*Vitis quadrangularis.*
(9)	,, *stapelioides*	*Stapelia micrantha.*
(10)	,, sp.	Pelargonium sp.
(11)	,, *Tirucalli*	*Senecio junceus.*
(12)	,, *xylophylloides*	*Epiphyllum truncatum.*

(2) *Ficus Krishnae.* *F. Krishnae*, a remarkable species most nearly allied to *F. bengalensis*, in which the leaves are cup-shaped, the inside of the cup being formed by the under surface of the leaf. *Mr. W. Fawcett.*—A parasitic flowering plant from Jamaica (*Scybalium jamaicense*, Schott and Endl.). This species is one of the Balanophoraceæ, a family of parasitic flowering plants growing on the roots of trees in tropical forests. They do not develop chlorophyll, and are therefore altogether dependent upon their host for sustenance. The seed contains an embryo of the simplest structure, having neither cotyledons nor radicle; it germinates in the soil, the embryo grows in length, thread-like, until it touches the root of a tree, and then penetrates it. When established on the root it forms a tuberous rhizome, from which flowering stems are produced. The flowers are very small, numerous, in heads on a stalk covered with scales—male and female flowers on distinct heads. This species is found in Jamaica, Cuba, and Hispaniola. Other species occur in Brazil and Colombia. *Mr. P. S. U. Pickering, F.R.S.*—Germination of seeds in heated soil. When soil is heated there is formed in it a substance toxic towards the germination of seeds and the growth of plants. Seeds germinate more slowly and in smaller proportions the higher the temperature of heating up to 250°. By exposure to air and moisture the toxic substance is destroyed. Plants grown rapidly in previously heated soil also show the presence of a toxic substance, but after this has become decomposed, such soil, owing to increased soluble contents and altered bacterial conditions, promotes plant growth.

Dr. G. H. Rodman.—A series of stereoscopic transparencies illustrating the life-history and minute structure of the stick insect (*Bacillus rossi*). Stick insects are natives of warm climates (India, Australia, the Malay Peninsula), but with care they may be reared in this country. They resemble, as their name suggests, portions of stick, and they afford an excellent example of mimicry. The various stages during the escape of the insects from their eggs are shown. The feet are provided with a pair of sharp hooks, by which they can cling to rough surfaces, and also with a pad or sucker, which enables them to get a foothold on perfectly smooth surfaces. The eye is a compound one, and faceted. They stand prominently out from the surface of the head, and are covered at will by the insect extending his forelegs directly forward in the long axis of his body. The skin is cast several times during the growth of the insect. It is shown that the antennæ and surface of the eyes share in the desquamation of the insect. *Dr. Francis Ward.*—(1) Photographs of fish life, as seen from below the surface of the water. (2) Photomicrographs of the growth of larval fish (plaice) taken from life. The photographs are taken in a pond specially constructed for the purpose. In one wall of the pond is a large open space which communicates with an observation chamber, and between this chamber and the water in the pond is a sheet of plate glass. Concealed in the chamber, the observer can watch the fish as they appear to each other in the water. In consequence of the darkness in the chamber and the light in the pond, the glass acts as a mirror, and the fish merely sees himself and his surroundings reflected, while the observer can plainly see into the pond. It is thus possible to observe a timid fish without disturbing him. In addition, an instantaneous

photograph can be taken at 1/250th of a second. *Dr. W. N. F. Woodland.*—Microscopic preparations and a model illustrating the mechanism employed in the production of the oxygen used to inflate the gas bladder of bony fishes. Most fishes employ oxygen (usually also nitrogen and carbon dioxide) for the inflation of the gas bladder (incorrectly termed "air" and "swim bladder") when this is present. The presence of oxygen is associated with the power of producing relatively rapid variations of the quantity of gas in the bladder, a power required in deep-water fishes which sink and rise, and so experience considerable changes in external pressure. A special gland, the oxygen gland ("gas gland"), and an equally important and very remarkable supplementary apparatus, the rete mirabile duplex, are developed in the bladder wall for the special purpose of producing the oxygen. The reason why oxygen is the gas employed for the inflation and deflation of the bladder is because of its abundance in the blood stream and the facility with which it is dissociated from (the red blood corpuscles undergoing disintegration for the purpose) and reassociated with the hæmoglobin of the blood.

Miss Dorothy Bate.—(1) Fossil remains of the peculiar goat-like animal *Myotragus balearicus*, Bate, from Majorca. (2) Photographs of the locality and caves in which the bones of Myotragus were found. Nothing is known of the habits or origin of this peculiar animal, which formerly inhabited Majorca in large numbers. Myotragus differs from all other goats, sheep, and their allies in having only two lower front teeth, which are very large and are modified to form a sharp chisel-edge; they grow continuously, like those of a gnawing animal such as the rat or rabbit. It is also remarkable for the shortness and stoutness of its metacarpals and metatarsals, the latter being usually united to the distal row of ankle bones. *Dr. C. W. Andrews, F.R.S.*—Remains of Tertiary mammals from near Lake Victoria Nyanza, British East Africa. The specimens shown are the first remains of Tertiary mammals from Central Africa. They are portions of the lower jaw with teeth, and a calcaneum of a small species of Dinotherium, which is very similar to *Dinotherium cuvieri* from the Lower and Middle Miocene of France. The age of the African beds is not yet definitely known, since it is possible that Dinotherium may have survived in Central Africa long after it had become extinct elsewhere. The specimens were obtained through Mr. C. W. Hobley, C.M.G., Commissioner of Mines. *Mr. G. C. Crick.*—Models of shells of extinct cephalopods. The models represent the shells of three cephalopods which lived in the Silurian seas and possessed chambered shells like that of the living pearly nautilus, but differed therefrom, among other characters, in the contracted form of the aperture of the body-chamber. *Mr. C. Forster-Cooper.*—Part of a collection of fossil mammals from the Lower Miocene beds of Dera Bugti, Baluchistan. (1) Jaw of a specialised type of primitive Rhinoceros; (2) separate lower incisor of primitive Rhinoceros; (3) portion of cranium of primitive Rhinoceros; (4) upper molar tooth of primitive Rhinoceros; (5) astragalus of primitive Rhinoceros; (6) mandible of Aceratherium, sp.; (7) teeth of mastodon, sp.; (8) upper teeth of Rhinoceros; (9) upper and lower teeth of an Anthracothere; (10) portion of a mandible of an anthracothere.

Nubian Archaeological Survey.—Objects found in the area to be submerged on the raising of the Aswan Dam. (Exhibited by the late Director-General of the Survey Department of Egypt, Captain H. G. Lyons, F.R.S., and the present Director-General, Mr. E. M. Dowson, on behalf of the Egyptian Government.) (1) Decorated pottery and other objects of the early dynastic period in Nubia (Dynasties I. and II. in Egypt, *circa* B.C. 3000), at which date Nubia was occupied by the Egyptian race. The hand-made pottery differs from that of the same period in Egypt in form and decoration, possibly owing to the geographical position of Nubia and to the rarity of stone vessels, the manufacture of which appears to have checked the development of fine hand-made pottery for funerary purposes in Egypt. (2) Decorative pottery and other objects illustrative of the non-Egyptian culture of the race (C group) which occupied Nubia from about the close of the old kingdom until it was expelled or absorbed by the military expeditions of the twelfth dynasty and the Egyptian colonies of the early new Empire. The incised pottery and steatopygous dolls show marked analogies with similar objects of the pre-dynastic Egyptian period of nearly 2000 years before.

Mr. Albert Bruce-Joy.—Bronze statue of the late Lord Kelvin by Mr. Albert Bruce-Joy, to be placed in Belfast. The likeness represents Lord Kelvin as he appeared about twenty years ago. The statue will ultimately be placed on a granite pedestal.

SHELL-FISH AND THEIR RELATION TO DISEASE.[1]

THE connection between the consumption of edible shell-fish (molluscs) and certain diseases, in particular typhoid or enteric fever, has in recent years attracted the attention of epidemiologists, and several valuable contributions on the subject have been published in this country. In 1894 Dr. Bulstrode reported to the Local Government Board on "Oyster Culture in Relation to Disease," in which he concluded that there remains "much to be done before the public can consume oysters, bought promiscuously, with a reasonable degree of safety." The danger of oysters was again brought home to the public by the outbreaks of enteric fever following banquets at Winchester and at Southampton in 1902, on which Dr. Bulstrode also reported.

Cockles and mussels have likewise been implicated in the dissemination of enteric fever in and about London and elsewhere.

The matter has assumed such importance that a further report on the subject by Dr. Bulstrode has been communicated to the Local Government Board, and brings up to date and extends our knowledge of the relationship between the consumption of shell-fish *other than oysters* and the occurrence of disease among those consuming the shell-fish. The molluscs of chief importance are cockles and mussels, and the beds are found all round our coasts, particularly in the estuaries of rivers, which are frequently liable to sewage pollution; but a part of the supply is obtained from abroad, America and Holland chiefly. In the report, the distribution of the shell-fish is shown on maps, and also the relation of the beds to the neighbouring sewer outfalls. The possibility of contamination is critically surveyed from a consideration of all the local factors, for the proximity or otherwise of a sewage outfall to a bed does not necessarily imply contamination or purity respectively; much may depend, for instance, on tidal conditions, on the absence of water at low tide, on the period at which the sewage is run out, &c. Again, even if the shell-fish beds themselves are remote from sources of pollution, the shell-fish may be brought to polluted waters for cleansing or storing, and several examples are given of this in the report. Bacteriological investigations have been excluded from the report, because it was considered that the topographical test would, on the whole, afford the least conflicting evidence.

Although shell-fish such as cockles are cooked before use, the "cooking" is often a very perfunctory affair, and by no means sterilises. At Leigh-on-Sea, however, owing to definite proof of the conveyance of enteric fever by the fish, the cockle merchants have provided forms of sterilisers or autoclaves in which the fish are exposed to steam under pressure. In the coppers in which the cockles are ordinarily boiled, while the bottom layers may be sterilised, the upper layers very often certainly are not.

The epidemiological evidence connecting the consumption of shell-fish with the subsequent occurrence of enteric fever or gastro-enteritis is detailed in chapters vi.–x. of the report. While in numerous instances it has been possible to connect the consumption of shell-fish with a subsequent direct outbreak of enteric or gastro-enteritis, it is more difficult to connect a part of the ordinary and sporadic incidence of these diseases with the general con-

[1] Report on Shell-fish other than Oysters in relation to Disease. By Dr. H. Timbrell Bulstrode. Pp. viii+243. Supplement in continuation of the Report of the Medical Officer. Thirty-ninth Annual Report of the Local Government Board, 1909–10; (London: Wyman and Sons, Ltd.; Edinburgh: Oliver and Boyd, Dublin: E. Ponsonby, 1911.) Price 8s.