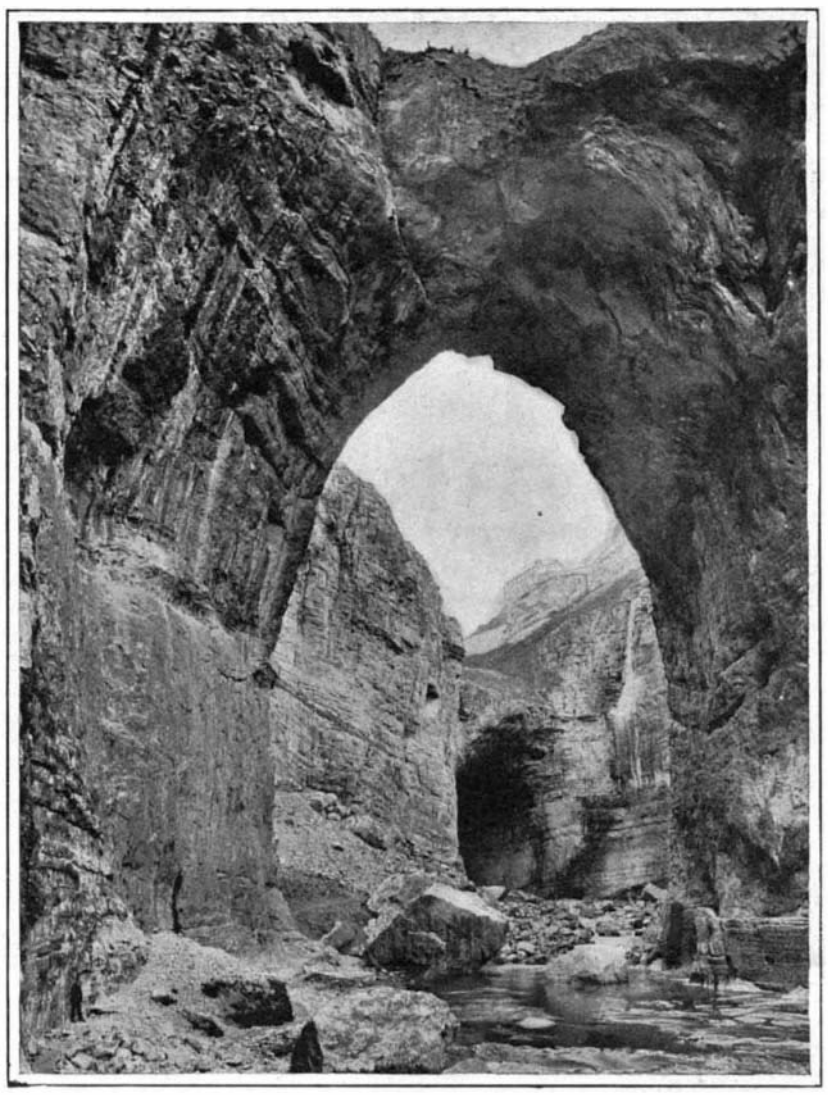
AN ALGERIAN NATURAL BRIDGE.

In considering the great natural bridges of the world, we are probably most familiar with the one in Virginia, which geologists believe has been formed by the collapse of a wall of a cave. In the State of Utah is another formation of this kind, which is of very large proportions. It is but little known, however, for the reason that it is far removed from the nearest railroad or highway. But comparatively few have visited it.

One of the most extensive bridges in the Old World is that illustrated in the accompanying photograph. It is located in Algeria, North Africa, and in the vicinity of the hill town of Constantine. Here the rock formation is so friable that it has disintegrated on an enormous scale, forming what would be called in America canyons and caves, besides the bridge in question. The opening formed by the archway of the bridge is several hundred feet in height, and over 250 feet in width at the point where the archway is of greatest dimensions. At the right of the picture will be noted the ruins of an ancient stone wall, which was probably used to support a highway beneath the bridge.



ONE OF THE GREAT NATURAL BRIDGES OF AFRICA.

A NEW FISH FOR AMERICA.

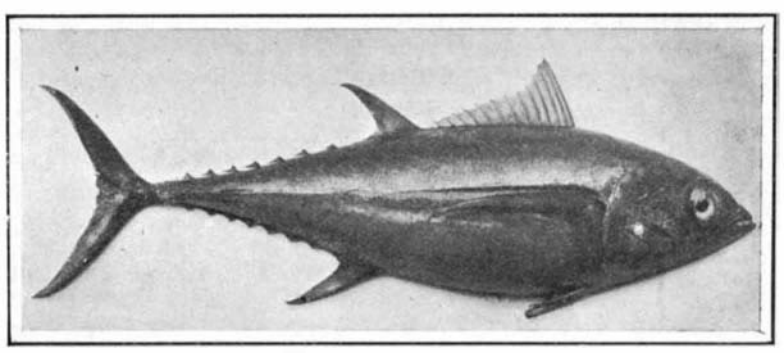
BY CHARLES FREDERICK HOLDER.

A very interesting episode occurred recently on the Southern California coast. A new and entirely unknown fish in America suddenly appeared in great quantities, and in the language of Dr. D. S. Jordan, who was the first to recognize the stranger, "added another link between America and Japan."

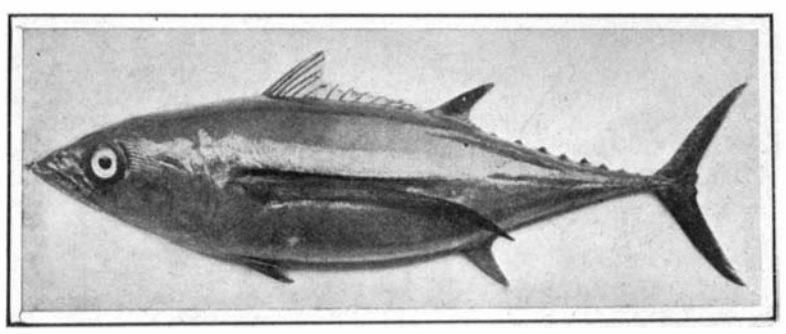
The fish was the Japanese yellow-fin albacore, shown in the accompanying illustrations, also known in Japan as the Hirenaga (*Germo macropterus*). It has been found for years in certain parts of Japan and the Hawaiian Islands, but never in this country. For some reason a large school wandered to Southern California islands, where for several months it afforded a harvest for boatmen and market fishermen. All the fishes taken averaged about fifty pounds in weight, were about three and a half feet in length, and bore a striking resemblance to the tuna or horse mackerel, the head especially being like it, and the body deep, like that of the larger fish. In other respects the fish resembles the albacore, the arrangement of the fins being very similar, the tail and finlets much alike in both fishes. The cheek or operculum in the albacore is the longest; the mouth or snout the most pointed.

The remarkable characteristic of the albacore, which is also illustrated herewith, is the extraordinarily long and swordlike pectoral fin, that reaches from the ventrals to beyond the anal. In the Japanese fish the pectoral fins have remarkable length, though by no means as long as those of the albacore, reaching to the front of the dorsal, being about the length of the dorsal. The Japanese albacore has nine or ten finlets which are a vivid lemon yellow, quite different from the tint observed in the tuna; hence the name, "yellow-fin albacore." In a general way the fish resembles the tuna, but with the side fins of an albacore, so that the casual observer or layman would believe it to be a link connecting these two fishes, a composite of albacore and tuna.

The islands of Southern California have been under intelligent supervision for fifty years, but never before has this interesting fish been reported, and as it is a choice market and splendid game fish, it is to be hoped that it will return every year.



Japanese Yellow-Fin Albacore, Which Appeared at Santa Catalina Island in 1906, for the First Time in America.



The Pelagic Albacore.

A NEW FISH FOR AMERICA.

It is stated that two hundred and thirty-one municipal acetylene plants are now in use in the United States.

Panspermy: The Transmission of Life from Star to Star.

BY PROF. SVANTE ARRHENIUS.

In 1903 I pointed out that the theory which has been called panspermy, according to which the germs of organic life are conveyed through interstellar space from one heavenly body to another, had gained greatly in probability from the establishment of the pressure exerted by light and other radiations as a demonstrated cosmical phenomenon. Since that time I have developed this view, which I present in more complete form in this article.

The theory was suggested by the failure of repeated attempts made by eminent biologists to discover a single case of spontaneous generation of life. The alleged discovery of albuminous substances on the sea bottom created a sensation in its day, and to the unknown organism which was supposed to have produced the albumen Huxley gave the name *Bathybius Haeckelii*. But the flocculent precipitate formed by adding alcohol to the sea water was subsequently proved to be not albumen, but sulphate of lime. Dr. Burke's "radiobes"—alleged organisms created by the action of radium on gelatine—have been demolished by Ramsay's criticisms, and a similar fate has befallen all other reported examples of spontaneous generation.

In 1871 Kelvin adopted the theory of panspermy, and expressed the conviction that the impossibility of converting lifeless into living matter without the aid of already living organisms is as securely established as the law of universal gravitation.

A great difficulty of the theory has consisted in the apparent impossibility of conveying germs even from one planet to another in a time through which their life could be preserved. Most germs can be kept alive only a few years, though some, including certain spores and the hard-shelled seeds of leguminosæ, retain the power of germination for several decades. A body moving with the speed of a railway train, 60 kilometers (37 miles) an hour, would occupy 150 years in going from the earth to Mars, and 70,000 million years in making the journey between the solar system and the nearest fixed star, Alpha Centauri. By introducing the pressure of radiation as a motive power these intervals may be reduced under favorable conditions to 20 days and 9,000 years respectively, as I showed in my previous article.

But even these intervals may appear to be of formidable length, especially in view of the absolute dryness and intense cold and light to which the germs would be subjected in transit.

Microscopic organisms differ greatly in susceptibility to the effect of light. Duclaux has shown that *Tyrothrix scaber*, which occurs in milk, can endure a month's exposure to bright sunlight, and Roux has proved that the energetic destructive action of light on the germs of splenic fever is dependent upon the presence of air, so that they are not injured by light in a vacuum. It appears, therefore, that light acts by means of a "photochemical" process of oxidation.

It has been demonstrated that intense cold is not injurious to all germs. Macfayden kept spores of bacteria at —200 deg. C. (—338 deg. F.) for six months, without injuring them appreciably. Probably the effect of cold is preservative rather than destructive. The diminution and ultimate loss of germinative power is certainly due to slow chemical changes. Now the rapidity of chemical processes decreases very quickly as the temperature is lowered. In the case of those vital processes that have been investigated a fall of 10 deg. C. (18 deg. F.) reduces the speed of reaction in the ratio of 5 to 2. The loss of vitality in interstellar space, at a temperature of —220 deg. C. (—364 deg. F.) would therefore be more than one thousand million times less rapid than the loss at 10 deg. C. (50 deg. F.); so that a journey of three million years through space would be no more injurious than a single day of exposure to terrestrial spring temperature. In the journey between the earth and Mars the temperature would be a trifle higher owing to the proximity of the sun, but the trip would occupy only a few months and the germs could survive.

The rapidity of the photochemical changes induced by light and the rapidity of desiccation would be similarly diminished by cold. Schroeder has proved that two algæ containing much water, *Pleurococcus* which grows on trees, and *Scenedesmus*, which lives in water, are not killed by being kept for 20 and 16 weeks, respectively, in a desiccator over concentrated sulphuric acid. These are vegetative organisms. It is probable that spores and seeds would survive much longer desiccation. Now it is natural to assume that desiccation, or evaporation, would be proportional to the vapor tension of water. The latter has not been directly measured at —220 deg. C. (—364 deg. F.) but it can be computed with sufficient accuracy from the latent heat of vaporization with the aid of a formula given by Van't Hoff. The result is similar to that already obtained for the loss of vitality, that is to say, desiccation advances no further in millions of years at —220 deg. C. (—364 deg. F.) than in one day at +10 deg. C. (50 deg. F.).

Hence we may perhaps conclude that the preservative effect of the low temperature of interstellar space assures the possibility of the conveyance of living germs from one solar system to another.

It appears not improbable that interstellar space is traversed, at enormous speed, by living germs which bring organic life to planets as soon as a crust capable of sustaining life has been formed.

Therefore spontaneous generation is unnecessary, as life can be transmitted from one heavenly body to another by minute germs propelled by the pressure of light. This idea involves another, which appeals to me very strongly, namely, that all organisms in the universe are related and the process of evolution is everywhere the same.—Translated for the Scientific American from Umschau.