belt drive it is an easy matter to change motor pulleys from, say 4 inches for hard road work, to a 5-inch or 7-inch size when the roads are fine, or for speeding on the track.

Although the several patterns of American chain-driven motor cycles differ ostensibly in model, and rationally in various constructive details, they may, on the whole, with propriety be classed together as belonging to the frame-contained motor chain driver, that is, the motor is invariably placed within, and never without, the frame. The Stearns, the 1902 racing model of which is herewith shown, is a type of the chain driver. This odd-looking machine was designed especially for speed to replace the motor tandem in furnishing pace to the racing men. The rear wheel is very wide, the hub measuring 11 inches in width. This arrangement serves to shield the rider following the machine against any undue wind pressure. In order to get the saddle down as low as possible, to further screen the rider, it is clamped directly to the upper frame tubing. The operator sits directly over the rear wheel, in easy reach of the motor, managing the steering by means of a brace of huge, elongated handle bars. The absence of pedals on this machine is explained by the fact that they are entirely superfluous for racing. The operator does not in any way aid the progress of the machine. There are two foot rests or stirrups into which he is supposed to put his feet. A De Dion 3¾ horse power motor furnishes ample power to send this machine around the track at more than fifty miles an hour. The motor is of the high-speed pattern, making from 600 to 2,000 revolutions a minute, and the gear is 132 inches. The weight of this machine, which was recently built to pace Jimmy Michael, is 165 pounds.

Among belt-driving motor bicycles, the Mitchell is undoubtedly the most characteristically American model, being in simplicity of design, ease of handling, and efficiency of power decidedly superior to any foreign machine, and unexcelled by any domestic make. I am speaking particularly with reference to the 1902 Mitchell model, the beautiful lines of which are herewith illustrated. The motor has a 3x3 inch cylinder, makes 1,800 revolutions per minute, developing an actual brake test power of 2 horse power, or, in other words, 3 to 3½ horse power as motors are usually rated. This power is sufficient to propel the machine at speeds varying from five to thirty-five miles in the hour. The frame is made of heavy-gage seamless steel tubing, and being only twenty-four inches high is exceedingly convenient. The hanger is dropped 2½ inches, and the wheel base is only 45 inches, making a very compact and strong design with no suggestion of clumsiness. In order to more perfectly balance the load and secure a long belt pull, the motor has been placed within the frame head directly under the rider's control, which position at the same time precludes the possibility of "skidding"—a not uncommon feature with machines having low-mounted motors.

The fuel feed is extremely simple and easy to manipulate. It is of the so-called "drip feed" system, which does away with the troublesome carbureting devices so common on foreign-built machines. Instead of the ordinary surface carbureter, a feed pipe is led direct from the gasoline tank into a small vaporizer. The quantity of fuel administered in this way is regulated by means of a small thumbscrew with a pointer on an index dial indicating the amount of gasoline fed to the vaporizer. The air inlet is fixed, the volume of air taken into the vaporizer being gaged by the working piston. Instead of the usual throttle valve between the carbureter and the engine, a drip feed of gasoline is introduced through the vaporizer into the engine by the suction stroke. There could be no more direct and simple form of liquid fuel feed. After filling the fuel tank with ordinary gasoline, and the lubricating tank with engine oil, the operation of the motor is effected by opening the valves of these respective tanks, besides the compression cock. The machine may now be mounted. After a few revolutions of the pedals, simultaneous with turning the left grip, which serves as a switch, to the right, three or four sharp explosions are sure to follow, whereupon the compression cock should be closed, and the motor will now carry the machine along at a slow, steady pace. Speed is increased by moving the handle of the "sparker" forward; speed is decreased by moving the handle backward; to slow down temporarily the switch may be turned off, and to stop the machine altogether the current is shut off by turning the left grip toward the left and at the same time applying the coaster brake by pressure on the pedals. On coming to a stop the sparking plug is taken out, the gasoline and the lubricating oil valves are turned off, and the compression cock is opened. These movements are exceedingly simple and elementary, and after practising the rudiments of operation a few times any ordinary wheelman will find himself in reassuring control of the machine. Among the improvements in the 1902 Mitchell is a ball bearing idler, a speed device placed conveniently for manipulation, and a valve lifter. The mixer used in connection with the motor has the merit of not being affected by travel over rough roads, like the ordinary kind of carbureters. This machine, while not a racer, is powerful enough for all touring purposes. The efficiency of the motor enables the operator to climb almost any hill, plowing through sand, and going against head winds at a fair rate of speed, while on good roads upward of thirty-five miles an hour may be negotiated. Fully equipped for touring, with 1¾-inch five-ply tires, the machine weighs 110 pounds. The tank capacity of the reservoir is seven pints, which is ample fuel for a distance of 65 to 75 miles.

The motor cycle industry may as yet be in its infancy, but it is, nevertheless, capable of producing machines like the above which are daily demonstrating a high degree of efficiency and reliability in practical work on the road.

International Geographical Congress.

Baron von Richthofen, the famous professor of geography in the University of Berlin, has just informed President Alexander Graham Bell, of the National Geographic Society of Washington, that the Executive Committee of the Seventh International Geographical Congress, which was authorized to make arrangements for holding the next meeting, has accepted the invitation of the Washington society to meet under its auspices at our national capital. The Congress will not be held till 1904 and there will therefore be plenty of time in which to arrange a programme of great interest and value. It will be the first meeting of the International Congress in the Western world and undoubtedly a large number of the foremost geographers of Europe will be present.

The society under whose auspices each congress is held has charge of the arrangements. The National Geographic Society, accordingly, will have nearly everything to do with the selecting of topics that will be most prominent in the deliberations of the congress. It will select men who are authorities in their special lines of geographic study to read papers and lead in the discussions.

Before the congress meets, the large and handsome home of the National Geographical Society will have been completed in Washington. The building is named in honor of the late Gardiner G. Hubbard, the founder and first president of the society, who lived to see many hundreds of persons, interested in geographic science in all parts of the country, enrolled among the members.

Baron von Richthofen, in his letter accepting the invitation of the Washington society, says: "There is, indeed, no place better fitted for geographers to assemble than Washington, which is the great center of scientific geographical exploration in America and the distinguished workshop of a considerable number of eminent men."

A conspicuous feature of these congresses has been a geographical exhibition containing a great variety of objects illustrating the world's progress in topographic and geodetic surveying, map, globe and relief-map making, the production of text books and other school appliances and so on. This feature was omitted in the last congress, held in Berlin, but it will be an important additional attraction if such an exhibition is held in connection with the Washington meeting. It would certainly be helpful to the geographical interest of this country if such a collection should be formed in Washington and permanently maintained there under the auspices of the National Geographic Society.

The society has had the assurance from the other geographical societies of the country of their hearty co-operation in making the meeting of the congress a success. The geographers of Washington express the hope that it may be found practicable to hold sessions of the congress in a few other cities in conjunction with their geographical societies. Such a meeting should certainly be held, if possible, in this city, where the American Geographical Society is about to open its new building on West Eighty-first Street. The edifice which this society has just completed is believed to be the most commodious and attractive structure occupied by any geographical society. It is a fitting home for the fine library which represents a half century of book collecting; and it offers facilities for reading and work that were not available in the smaller house so long occupied on West Twenty-ninth Street. Boston is the home of the Appalachian Club, Philadelphia of the Philadelphia Geographical Society, and Chicago, San Francisco and Seattle also have their geographical societies.

Excursions are always a prominent feature of these congresses. The Washington society expects to offer its guests an attractive series of excursions to points of geographic interest. Washington is centrally situated in respect of natural features that appeal to geographic students. Niagara Falls, the Natural Bridge of Virginia, Luray and Mammoth Caves are within easy reach. It is probable that one of the excursions will be to the Pacific Coast.

The preparation for one of these international congresses involves an enormous amount of labor, but since the first congress was held in Antwerp in 1869 they have been found to be worth all they cost in the geographic results attained and the opportunities they have afforded for social intercourse among the foremost workers in this field of knowledge. The National Geographic Society will certainly spare no effort to make the coming congress a success; we may look for a very large convocation of geographers here in 1904, says the New York Sun.

HYPNOSIS IN FROGS.

Hypnosis in animals is a question that has been very little studied. At the Fifth International Congress of Physiology, which recently met at Turin, Mlle. M. Stefanowska, of Brussels, read a very interesting paper upon this subject entitled "The Conditions Favorable and Unfavorable to Hypnosis in Frogs," and of which the following is a brief abstract.

Frogs that have remained in an aquarium during the winter afford excellent subjects for the study of hypnosis, at the moment when they are thoroughly exhausted by a prolonged fast, that is to say, in spring and early summer. As soon as they are turned upon their backs they fall into a hypnotic state which often reaches that of catalepsy. In a state of profound hypnosis, the action of the organs of the senses is suspended and the kinesthesic sense is greatly blunted, as is also the sensitiveness to pain. The pupils are always contracted, but dilate as soon as the animal awakens. The cardiac motions slacken and the respiratory ones are often scarcely perceptible. Such a state may persist for half an hour or more.

Profound hypnosis is still more marked in winter frogs when their body has lost much water in consequence of a stay in a dry place. Such frogs cannot always be awakened at the moment desired.

Frogs captured in spring undergo hypnosis under the same circumstances, but are more resistant. They become more and more hypnotizable in measure as their fast is more prolonged. This fact accords with the observation of Gley that hypnosis is easily produced in frogs that have grown lean. According to Mlle. Stefanowska, exhaustion, a prolonged fast and the loss of water appear to be the conditions favorable to the production of hypnosis and catalepsy in adult frogs. Let us remark further that, according to the researches of this author, frogs in a state of profound and prolonged hypnosis immediately awaken as soon as they are surrounded with the vapors of ether, chloroform or alcohol, which act primarily as excitants. The vapor of ammonia acts in the same way. The abrupt or progressive elevation of temperature always interrupts the state of hypnosis. On the contrary, a lowering of the temperature does not awaken frogs, and even appears to be favorable to hypnosis. The three accompanying figures show a few characteristic attitudes of frogs in the hypnotic state. Upon looking at them we cannot prevent ourselves from thinking of the attitudes of hysterical persons plunged into a hypnotic sleep. The frogs present nearly the same spasmodic positions as do those hypnotized subjects christened so picturesquely by Féré as "laboratory frogs." The difference resides in the suppleness of the attitudes, which are purely muscular and general in frogs, but more delicate and at the same time more expressive in hysterics. It is true that the animal scale embraces many types of vertebrate from the nervous frog, which also has its hysterical individuals (as De Tarchanoff has recently demonstrated), up to the noble hysteric belonging to the last round of bio-organic evolution.

We dwell upon the researches of Mlle. Stefanowska, aside from the importance of the question in itself, because we too have made some experiments upon hypnosis in frogs and especially upon the species known as *Rana temporaria*. We shall here sketch the principal facts of such researches in a brief manner, it being our intention to return to the subject in a general work on hypnosis in animals. In fact, we have experimented, and are continuing to experiment, upon dogs, cats, guinea pigs, rabbits, chickens and snakes. To our knowledge, no work has been undertaken upon so numerous varieties of animals. At present, we shall occupy ourselves with hypnosis in frogs solely.

Gley makes a correct observation in remarking that hypnosis is particularly favorable in half-starved frogs. The fact is true, and our observations agree with those of Mlle. Stefanowska. Our frogs, emaciated or fasting, were easily hypnotized, and a goodly number of them entered into a cataleptic state. Their sensitiveness was almost abolished, their pupils punctiform, and their circulation slow; and their respiration became so much the more superficial in proportion as the hypnosis became more profound, and that, too, with a crisis of internal respiration corresponding to a marked acceleration of the heart. What is new in our experiments is the hypnotizing of frogs by looking them in the eye, and aside from any fasting. We made the experiment in summer, taking care to feed the animals in an aquarium in which they were living immersed in water.

The frogs were therefore in the best of conditions of vitality and in a state sensibly near that of their normal life.

In one series of experiments, we tried to hypnotize the frog by holding it in the hands and turned upon its back. It is extremely difficult to get the gaze of the frog. The color of the skin and eyes and the absence of expression in the look render the fixation of the latter difficult. It is necessary to perform the experiment as far as possible under conditions of uniform light. We experimented with both daylight and artificial light. This often constitutes a source of error in acting as an element of fatigue. Some precautions have to be taken by the experimenter for holding the frog in the hands. It gesticulates, as it were, its heart beats rapidly and its body easily slips between the fingers, and these are so many coefficients that have an influence upon the success of the experiments. The frogs go to sleep quite easily after some resistance. We have had frogs in our hands that we could not put to sleep until the end of an hour, and others that we could put into merely a slight slumber. The gaze, therefore, acted, as in human subjects, outside of any special experimental condition.

In a second series of researches we tried to produce sleep in frogs in a state of liberty, and that, too, under two different conditions. The frog was placed upon the laboratory table or was swimming in a sufficiently deep glass vessel in which we could observe it at our ease. The hypnosis then became more difficult, that is to say, it took a longer time to effect it. As is well known, frogs in a state of rest have an attitude quite well adapted for hypnosis. They look upwardly and the head reminds one of an attitude of ecstasy or admiration. I have succeeded experimentally in putting them to sleep upon the spot and in piercing their skin with a needle or hot iron without their manifesting the least reaction. The hypnosis, although profound, does not last long. It is short, in fact, and the animal often awakens, making an abrupt leap.

Hypnosis is likewise possible when the animals are swimming in a glass crystallizing pan, but it requires time and a dexterity that experiment alone can give. It is quite a characteristic fact that, although able to hypnotize frogs, we never could succeed in making them jump into the water. The hypnosis was not profound, although the sensitiveness became obtuse; it seemed as if the animal was automatically master of its kinesthesic attitude. The changes of position were delicate, although possible, and were incapable of extending to changes of the whole body. What characterized the profoundest state of hypnosis that we were able to obtain was a slight plunge into the water with a few "cat-naps," generally followed by an awakening. If the water was slightly heated, the hypnosis was interrupted; but Mlle. Stefanowska has, on the contrary, observed this fact in other states. When the temperature lowered progressively it appeared as if the frogs ceased, in a certain measure, to be master of their position in the water.

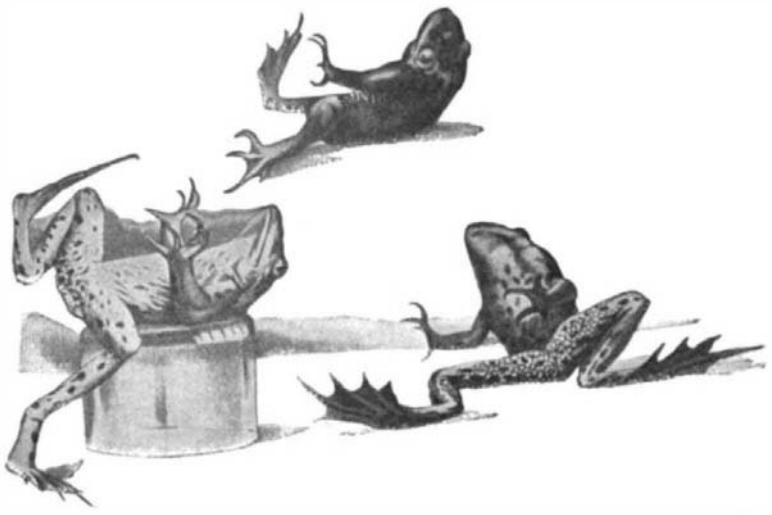
These facts, similar to those observed by Mlle. Stefanowska, but of the complete details of which we are ignorant, and especially to those observed by Gley, speak peremptorily in favor of the possibility of hypnosis in frogs, and demonstrate once more the anæsthetic power, so to speak, of the human gaze, that complex factor which seems to synthetize our whole dynamic cerebrality when it is in action. It must be concluded, then, that such gaze acts not only upon man, but upon frogs. There are here some important psycho-physiological approximations that make us reflect upon the nature of that mysterious force which slips through the windows of our psycho-organic life and acts as a true anæsthetic in fixing the attitude of animals like those of man and paralyzing all cerebral life.—This description was written by N. Vaschide, in La Nature.

H.M. Consul-General reports that it has recently been stated that the German government has contributed a certain sum toward the costs of experiments which are being made in Germany for providing fishing (sailing) vessels with auxiliary screw propellers worked by petroleum as motive power. Such an arrangement would, it is thought, be of great advantage, for the fishing vessels would thus be able to fish during complete calm, and, while earning more in this way, would also be able to convey their catch more quickly than at present to market.

A RARE FISH.

BY C. F. HOLDER.

From a zoological point of view the island of Santa Catalina, which lies eighteen miles off the coast of Los Angeles County, Southern California, is very interesting, many rare animals being found there. Every winter the dwellers of the island find numbers of Argonaut shells and several living specimens have been secured, one for a time living in the aquarium which is maintained here for the benefit of students and the entertainment of visitors. A number of rare and interesting fishes wander inshore from time to time. Several years ago I found various Scopeloid fishes, which up to that time had been considered rare, and during the past few years I have

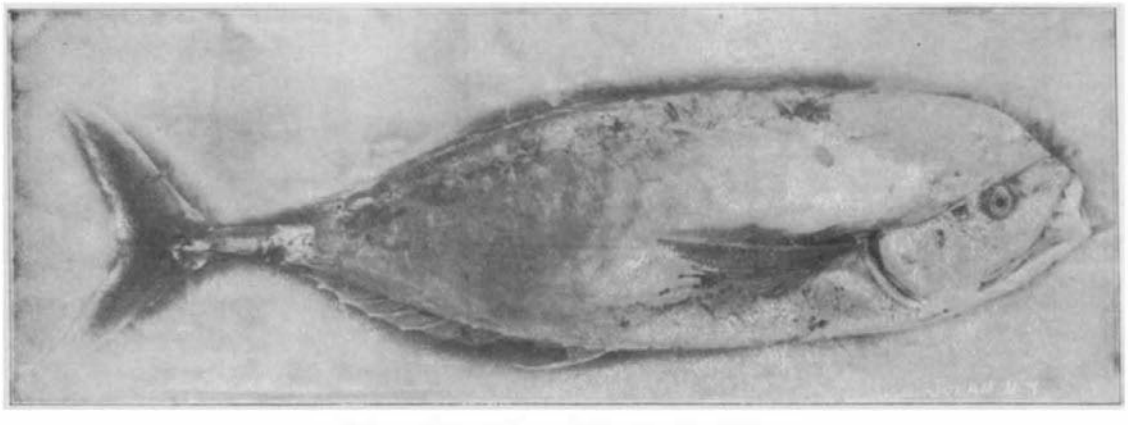


DIFFERENT ATTITUDES OF HYPNOTIZED FROGS.

seen one oarfish (*Regalecus russelli*) alive, while another was brought to me dead. From reports I judge that a number of these very rare fishes have been observed here. The first was of small size, not over two feet in length, and was discovered swimming in shallow water along the beach of Avalon Bay. I had an opportunity to observe the radiant creature before it died. Its "topknot"—it can be compared to nothing else—was a vivid red or scarlet mass of seeming plumes—the dorsal fins, which merged into a long dorsal fin, extending to the tail. The color of the body was a brilliant silver sheen splashed with equally vivid black zebra-like stripes, which gave the fish a most striking appearance.

The fish was a fragile and delicate creature, a very ghost of a fish, which swam along where the water gently lapped the sands, with an undulatory motion, looking like one of its names—the ribbon fish. The fortunate finder of this specimen could not be persuaded to give it up or sell it, and it was its fate to be pasted upon a piece of board, dried in the sun as a "curio," where, as if in retaliation at the desecration of so rare a specimen, it soon disappeared.

This apparently was the first oarfish ever seen in the United States, so at least Dr. G. Brown Goode wrote me at the time that it had not been reported. In 1899 another oarfish was brought to me, evidently having been washed in after a storm and found



A VERY RARE FISH—LUVARUS IMPERIALIS.

The first specimen ever seen in America, found at Santa Catalina, Cal.

within a few yards of the former at Avalon. The discoverer of this specimen also refused to allow it to be properly preserved, or to donate or sell it to any one who would have sent it to some museum, but, believing it valuable as a curio, also impaled it, the delicate creature evaporating under the strong heat of the semitropic sun.

This, as stated, was the second fish discovered, and during the past winter (1900) a fine large specimen came in at Newport Beach, being reported by H. J. Forgy, of Santa Ana. The newspapers announced that a Mexican had found a young sea serpent at Newport, and investigation showed that, as in hundreds of similar instances, the man had found a valuable prize without being aware of it. According to the account, the discoverer first saw the fish alive in the surf and hauled it ashore. Being ignorant of its value he cut it up, bringing in a part of the scarlet fins and a slice of the flesh. This he showed to some men, and led the way to where lay the mutilated remains of one of the finest oar or ribbon fishes ever seen. The specimen was twenty-one feet in length, and its weight estimated at five hundred pounds. The finder had so mutilated it that the fish was ruined for almost any purpose. If he had packed it in salt the specimen would have returned him the equivalent of several months' labor. Apparently the man had cut it up in wanton amusement.

This recalls a similar incident. I was on one occasion excavating at San Clemente Island, and had remarked that it was a singular fact that all the fine stone ollas were broken. "Nothing strange about that," said a half-breed, one of the party. "I used to herd sheep here, and we smashed mortars and ollas to pass away time."

One of the most interesting visitors to Catalina came ashore at what is called the Isthmus. It was somewhat mutilated, as shown in the accompanying illustration, and was entirely new to the fishermen, some of whom were Venetians. The fish was evidently allied to the mackerels, and when found displayed evidences of great beauty of coloring, at its best undoubtedly being an active and beautiful fish. In response to a photograph sent to Dr. C. W. Gilbert, of Stanford University, he wrote; "It was not until recently that I have had opportunity to examine carefully the photograph, which obviously represented no species known to the Californian coast. I find now that it represents an undoubted specimen of a form hitherto known only from the Mediterranean and neighboring waters—*Luvarus imperialis*. It is said to be rare in its home waters, and is yet unreported from our Atlantic coast."

This wanderer was injured in some way, possibly cast up by a winter storm. According to Goode and Bean, "Oceanic Ichthyology," the type specimen was about two feet long, observed by Rafinesque at Solanto, Sicily, June 15, 1808. It is a rare fish, but has been seen at Nice, at Malta, Elba and at Cette, and a fine specimen can be seen in the Museo Civico at Genoa; but so far as known none of the American or any of the other museums of Europe have specimens. The fish has been observed at Madeira, both old and young, according to the same authorities, and Steindachner reported it from the coast of Spain. In 1866 a small specimen came ashore on the Cornish coast, and from this Day made the figure to be found in "Fishes of Great Britain and Ireland." Giglioli has pointed out the interesting series of metamorphoses by which *Astrodermus* and *Diana* develop into *Ausonia* and *Luvarus*. But one species and a single genus are known.

The Current Supplement.

The front page article of the current SUPPLEMENT, No. 1355, describes both verbally and graphically the progress of the work on the Simplon Tunnel, one of the most stupendous engineering works of our time. Another engineering article, both timely and interesting, is a comparison between the proposed Nicaragua and Panama canals, in which the former is shown to be distinctly inferior to the latter. A simple form of differential gear for bicycles in use in France is described and illustrated. Rear-Admiral George W. Melville's address at the unveiling of the monument to Robert Fulton, erected in New York, is published in full. "The Economic Position of Japan" chronicles the progress made by the most enterprising of Eastern peoples during the short period of its modern commercial existence. The director of the Blue Hill Meteorological Observatory, A. Lawrence Rotch, discourses instructively on the use of kites in obtaining meteorological observations, supplementing his written work by illustrations of rare value. Among the technological articles will be found a treatise on the "Enameline Process—Etching on Zinc," which contains information that, probably, cannot be obtained in any of the books on process engraving. Something new about Carthage, a city whose historical interest is rivaled only by that of Rome, is told in a fully illustrated article bearing the title "The True Carthage." A concise and thorough résumé of "Batrachia and Reptilia" will prove of interest to our zoological readers.