periments. It remained for the writer to show that their choice of experimental animals was particularly unfortunate (Oslund).[15] In these animals (rodents) the testes are free to move from the scrotum into the peritoneal cavity and vice versa. Following ligation or resection of the vas deferens, the testes are often retained in the peritoneal cavity by adhesions. It is this artificial cryptorchidism that causes degeneration of the germinal epithelium. Vasectomy alone does not cause such degenerative changes. In order to carefully test this point several extensive series of experiments of from fourteen days' to ten months' duration were performed upon rats and guinea pigs. Degeneration of the germinal epithelium did not follow ligation of the vas deferens in any experiment of short or long duration where the testes were known to reside in the scrotum following the operation. Degeneration did take place in every experiment where the testes, either uninjured or vasectomized, were retained in the peritoneal cavity.

In a later paper it was shown that vasectomy on dogs does not produce degenerative changes in the testis or hypertrophy of interstitial cells (Oslund).[16] In rodents the inguinal canal is patent, while in carnivora it is closed and vasectomy results are not complicated by the possibility of accidental cryptorchidism produced by the operation. Care was taken to eliminate all extraneous factors, such as diet and confinement. Following closure of the vas deferens, there is an accumulation of testicular products in the epididymis which leads to its distension. An equilibrium between rate of spermatogenesis and absorption of this material is quickly reached, and no degeneration of seminiferous tubules takes place.

A detailed review of the literature bearing upon vasectomy on animals having a closed inguinal canal strikingly emphasized the above points. From such a review it has been pointed out that vasectomy on sheep from seventy-six days to one year, on dogs from sixty days to four years and on man from twelve days to four years has produced no testicular changes (Oslund,[16] p. 117).

What, then, of interstitial cell, "puberty gland," hypertrophy? In a recent paper it has been shown that unless there is degeneration of the germinal epithelium, interstitial cell hypertrophy does not take place (Oslund).[17] The interstitial cells occupy the spaces betwen the seminiferous tubules. Only when these tubules atrophy are these spaces increased in size. It is then quite evident that increase in interstitial cell mass, either in cell number or in cell size, can take place only when these tubules atrophy. When an increase of interstitial cells takes place it is largely regulated by tension and pressure within the testis. Compensatory hypertrophy of interstitial cells is very probably a misnomer and not a reality (Oslund,[17] p. 595).

It then appears that vasectomy causes no changes in the testicle proper. The epididymis becomes somewhat distended with testicular products. There results no degeneration of germinal epithelium and no interstitial cell hypertrophy. The changes claimed to have resulted from vasectomy appear to have been produced by subsequent influences rather than by vasectomy itself.

The theory of rejuvenescence at present is based upon a necessary interstitial cell hypertrophy. Ligation of the vas deferens does not produce such a hypertrophy. Vasectomy, therefore, can not be looked upon as a method of causing rejuvenescence.

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[15] Oslund, "Vasectomy on rats and guinea pigs," *Am. J. of Physiol.*, 1924, Vol. LXVIII, p. 422.

[16] Oslund, "Vasectomy on dogs," *Am. J. of Physiol.*, 1924, Vol. LXX, p. 111.

[17] Oslund, "Interstitial cell hypertrophy," *Am. J. Physiol.*, 1924, Vol. LXIX, p. 589.

THE HARVARD SUMMER SCHOOL OF GEOLOGY

RECENT mention in SCIENCE (August 22, 1924) of the summer school of geology being conducted by Professor Grant, of Northwestern University, moves the undersigned to offer the following account of the Harvard school which was held under Professor Shaler, in camp, on Cumberland Mountain, near Cumberland Gap, on the Kentucky side, in June, July, August and September, 1875. This antedates Professor Grant's camping school 49 years and shows that the idea of a camping school of geology is not new in this country. The names of some prominent men connected with this school or who have since become prominent, especially in science, and some personal reminiscences may not be without interest.

The writer, born within ten miles of the first pig-iron furnace in America, on the trail left by Spotswood and the Knights of the Golden Horseshoe, after leaving the Virginia Military Institute, Lexington, Virginia, reached Kentucky on St. Patrick's day, 1874, when Professor Nathaniel Southgate Shaler, of Newport, Ky., and Harvard College, was directing the reinstated Kentucky Geological Survey begun by David Dale Owen in the early fifties. Professor Shaler conceived the idea of holding the Harvard summer school of geology in connection with the work of the survey the next summer.

Camp Harvard, on the Harlan C. H. road, at the foot of the Pinnacle, some mile or more west of Cum-

berland Gap, was reached on July 4 of that year. In the party there were some 15 or 20 Harvard students who reached Norfolk, Virginia, by water, thence to Morristown, East Tennessee, then on foot to the camp.

The officers of the camp (all members of the Kentucky Geological Survey) were Professor N. S. Shaler, state geologist, Jno. R. Proctor, camp master, Philip N. Moore, of Missouri, geologist, Chas. J. Norwood, of the same state, geologist, A. R. Crandall, of New York and Wisconsin, geologist, Lucien Carr, of St. Louis, archeologist, J. H. Talbutt, Lexington, Kentucky, chemist, and James Mullen, of Lexington, Kentucky, photographer. Colonel W. C. P. Breckinridge, wife and family of four children, together with Mrs. Pickett and Misses Desha and Kinkead, were with us for the summer. With us also were Professor Shaler's wife and little daughter, and Mrs. A. R. Crandall, also Colonel Gordon McKay, millionaire of Boston, inventor and patentee of the McKay stitch, and Hon. John D. White and sister. The school was 40 miles from a railroad, on the east or Tennessee side, and 75 on the west or Kentucky side; almost entirely inaccessible by means of wheeled vehicles, but wonderfully located for the study of geology, as there was immediately by an exposure from the Upper Coal Measures to the Potsdam Sandstone, finely exposed, with faults, anticlines, synclines, etc., well displayed. There were between 30 and 35 men, the majority of whom were students under Shaler at Harvard, who were the basis of the camp. Of that number the following have done professional work, and some of them still are doing it:

Wilbur F. Barclay, Russellville, Kentucky.
Malcolm H. Crump, Bowling Green, Kentucky.
Wm. M. Davis, Cambridge, Massachusetts.
J. W. Fewkes, Washington, D. C.
Jno. Alva Myers, W. Liberty, West Virginia.
Jno. Murdock, Cambridge, Massachusetts.
H. H. Straight, Oswego, N. Y., father of the late Major Straight.
J. E. Todd, Tabor, Iowa.
R. H. Wildberger, Clarksdale, Mississippi.
J. S. Diller, Washington, D. C.
Geo. H. Eldridge, Cape Cod, Massachusetts.
S. S. Green, Swarthmore, Pennsylvania.
W. M. Linney, Harrodsburg, Kentucky.
H. A. Mertz, Bethany, West Virginia.
Richard Parsons, Plymouth, Ohio.
W. L. Titus, So. Amesbury, Massachusetts.
F. Jackson, Boston, Massachusetts.

Among the visiting instructors were Dr. Safford, state geologist of Tennessee, Mr. Kerr, state geologist of North Carolina, and David Starr Jordan, the star fisherman of the occasion.

The students were provided each with a steel hammer weighing some four pounds, together with note books, suited to the work, compass, clinometer and a bottle of hydrochloric acid for distinguishing the difference between ordinary limestone and dolomite (the writer has his tools yet). Parties of four to six were sent out with some one of the faculty for one to several days, with instructions to make sections along the road from the Gap on one side as far as Morristown, Knoxville, Speedwell, also along the mountains on the Kentucky side for the outcrops of coal which abounded in that vicinity. Reports were made on the return which were criticized in public by Shaler under a large lecture tent that formed a conspicuous portion of the camp.

Lectures were given every night by Shaler or some member of the faculty, with illustrations on blackboards, etc. The students were housed in several large tents, provided with cots, water being very convenient from a large spring near by; meals were supplied and served in another tent of considerable size and were prepared by the most important individual of the camp, known as Jim, very black, from Frankfort, Kentucky, with an assistant, even blacker, if possible, who knew how to fry chicken and make the best corn-bread, which even the New Englanders learned to love. Colonel McKay occupied a large private tent, with his original shoemaker's bench and kit of tools, with which he frequently came to the rescue of the unfortunate whose footgear needed attention.

There was also a party of topographic engineers in charge of William Byrd Page, a distinguished graduate of the Virginia Military Institute, of Norfolk, Virginia, with his several assistants. He had been delegated from the state survey to head a party of the U. S. Coast and Geodetic Survey, who established a base line in Yellow Creek valley where Middleboro now stands; this was probably the first work of the kind done by the state and nation in Kentucky.

The camp broke about the second week in September into many small groups, each headed by some competent instructor, who went in various directions, the writer, with Wildberger, Barclay and Straight, accompanied by Dr. Safford, passed through East Tennessee to the North Carolina line, where we met Mr. Kerr, state geologist of North Carolina, and by him were introduced to the very difficult stratigraphy of the pre-Cambrian formations, up and along the French Broad, via the Hot Springs, where we met the widow and young daughter of Stonewall Jackson, thence to Asheville, where Mr. Kerr left us and we four pursued our way up the Swannanoah to Grey Eagle at the foot of Mt. Mitchell, thence the

next day to the top where we slept in the rain with a party of mountaineer cattle-herders, who kept a roaring fire during night. Here our mountain guide departed and left us to the mercy of the very indistinct blazes on the trees; we ran across Big Tom Wilson, who found the body of Dr. Mitchell, whose life was lost by falling over a precipice into a ten-foot pool of water; thence to the ancient mica mines of Bakersville, and Burnsville, where Wildberger was stricken with typhoid and with Straight was taken to a railroad some 75 miles away, while the writer and Barclay crossed Roan Mountain, stopped on the Tow River, spent our last quarter for supper, lodging and breakfast, and made the distance (40 miles) to Johnson City on one dime, which the lady who gave us dinner refused to take. We reached the railroad at Johnson City, where our finances were replenished, and home next day after a tramp of some 400 miles with much profit and still greater pleasure.

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SCIENTIFIC EVENTS

ST. GEORGE EXPEDITION TO THE PACIFIC

THE St. George Expedition to the Pacific reached the Isthmus of Panama on June 9, 1924, and from there visited Isla del Rey in the Pearl Islands, Gorgona off the Colombian coast, some of the islands of the Galapagos group, Cocos (one day only, as weather conditions were unfavorable for a longer stay), Coiba Island and Taboga Island.

Zoological collections were made at all these islands. Mammals and reptiles were taken by Mr. P. H. Johnson, and his collection includes a white-faced black monkey, a three-toed sloth, three species of bat and a good series of rats from Gorgona; a howling monkey from Coiba Island and a series of rats exhibiting a wide range of variation from the Galapagos Islands.

Over three hundred specimens of birds have been obtained by Lieutenant-Colonel H. J. Kelsall. This is far less than he had hoped for, but various unforeseen and unavoidable difficulties in connection with collecting were experienced. Four species only of land birds were obtained on Gorgona during eight days' careful collecting; and, of these, two only were at all common. The forest, which is fairly dense, was penetrated to the summit of the highest peak, about 1,200 feet high, and up the courses of several of the very numerous streams.

Miss Cheesman has devoted her attention principally to those orders of insects which are most wanted by the British Museum as they are often not obtained by the ordinary collector. Lepidoptera and coleoptera have been collected by Mr. C. L. Collenette with the assistance of Miss C. Longfield. It is probable that some of the species of insects will prove to be new, but it is impossible to ascertain this until the collections have been worked out.

Dr. C. Crossland has collected the marine worms, Nudibranchs, Polyzoa, Hydroids and Algae. It is expected that these will afford most useful data for the settlement of synonomy and consequently for better knowledge of geographical distribution. At least five Atlantic species of polychaetes have been found in the Panama region, indicating that an appreciable number will be found common to both the Atlantic and the Pacific when the collections shall have been systematically examined.

Mr. J. Hornell has collected marine and terrestrial mollusca, while Mr. L. J. Chubb has amassed an extensive series of rock specimens and notes from the various islands.

The outstanding event of the expedition, so far as can be judged at present, has been the discovery of figures graven upon large boulders now lying between high and low water marks on the eastern shore of Gorgona. The first of these was found by L. Cullingford, one of the crew, and brought to the notice of Mr. J. Hornell, the ethnologist, who subsequently discovered a good many others. The most important were two series of archaic figures, among which are to be distinguished what appear to be rude representations of sun-gods and a stepped pyramid, together with figures of monkeys, birds and other animals. Besides these there are two comparatively modern sculptured portraits; one perhaps of Inca age, the other probably referable to the buccaneering days of the eighteenth century. Some stone weapons and implements were also found, associated with potsherds of considerable interest. Photographs and squeezes of the sculptures were taken and have been sent to the British Museum.

It was unfortunate that our botanist, Mr. L. A. M. Riley, was forced on account of serious ill-health to return to England from Panama; botanical specimens were, however, collected at most places by the other scientists and sent to Kew.

We understand from a cable recently received that much interest has been aroused by the archeological discoveries, while the authorities at Kew attribute considerable importance to the collection of flowering plants made at Gorgona, in consequence of which the scientific staff have decided to pay a second visit to this interesting island in order to search it thoroughly for further archeological remains, and to make the botanical material as complete as possible. It is intended to explore the western side and southern end of the island, which it was not found possible to do during our first visit.

An interesting series of kinema and still photo-