THE NATURAL HISTORY OF THE JEWS.

In recent issues of the SCIENTIFIC AMERICAN SUPPLEMENT there have appeared several articles with regard to the distribution, numbers, anatomical characteristics, etc., of the Jewish race, a race, we may add, which we hold in high respect for its vitality, energy, thrift, intellectual force, and, under favorable conditions, high moral worth. The last article, in the issue of January 1, contains an interesting comparison of the physical measurements of Russian Jews with corresponding measurements of other races inhabiting the dominion of the Czar.

The measurements were made by Dr. G. Schultz, Conservator of the Anatomical Museum of St. Petersburg, and indicate that the racial characteristics of Oriental Jews are as strongly shown in their physique as in their social and religious customs.

Unfortunately the writer, manifestly biased by the anti-Jewish craze which is showing itself so discreditably in certain parts of Europe, went on to assert that the bodily peculiarities of the Jews were accompanied by and served to account for certain alleged mental and moral traits the reverse of honorable. The incorrectness and injustice of these assumptions are pointed out very forcibly in the current issue of the SUPPLEMENT, in an article which is well worth reading.

From an American point of view the opposition to the Jews, which has lately been revived in Germany, seems to be due partly to a survival of the unchristian spirit of medieval Christianity, but more immediately to the hatred which thrift always inspires in the unthrifty. The military ardor which has converted Germany into a great camp has drafted the flower of German youth into army barracks, and diverted the best energy of the people from productive pursuits. At the same time it has impoverished the masses by direct heavy taxes to support the military establishment, and still heavier indirect taxes in cutting off the supply of productive labor. Though many Jewish youth in Germany have proved the native courage of the race on recent battlefields, the more peaceful instincts of the race have led them to seek in commerce and in the professions the distinction which the Christian youths of Germany have looked for in military and official positions. And now the cry is that the Jews monopolize the sources of wealth, and that they crowd the professions and other pursuits of peace and profit. The charge is doubtless largely true, but that fact is as much to the honor of the Jews as it is to the dishonor of those whose lower civilization has allowed them to be distanced in the competitions of peaceful industry, intelligence, persistence, and thrift. If the physically and numerically weaker race can distance their stronger and more numerous competitors in the arts of peace, the fact must be taken as evidence that mind counts for more than stature, and thrift and labor for more than military ardor, in the free conflicts of modern civilization.

DIAGONAL AVENUES IN CITIES.

The rectangular method of laying out cities leads not only to architectural monotony, but also to a great loss of time and travel as soon as the area covered becomes at all extensive. The tendency to go across lots, to save time and distance, is one condition of civilization; and when thousands of people are concerned the thwarting of the tendency is the reverse of profitable. A rectangular system of streets, with diagonal or radiating avenues, like those of Washington, is vastly more convenient.

In a paper read before the Philadelphia Engineers' Club, Professor Haupt, of the University of Pennsylvania, shows that the combined system is also vastly more economical. In a city like Philadelphia, where half a million people live at least a mile from the business center, the checker-board plan leads to an enormous waste of time and effort. To those whose homes lie in a direction diagonal to the run of the streets, the zigzag course they have to take increases their travel more than a third. A diagonal street through the heart of the city would save a mile and a third. The street car lines of the city carry something like 100,000,000 passengers a year. Upon this and the average yearly expense to the people of travel, Mr. Haupt calculated that every mile less in distance was a saving to them collectively of $1,500,000 in money, 4,000 years in time, and something like 3,300,000,000,000 foot pounds of energy.

Two diagonal avenues were recommended for Philadelphia, with "cut-offs" or diagonal lanes for pedestrians.

SUBAQUEOUS GOLD MINING.

A few days ago a schooner sailed from Bristol, R. I., laden with a small river steamer, a steam launch, and an outfit of mining machinery for working the auriferous bed of the Atrato River, South America. It is well known from the careful surveys made of the Atrato, in the interests of the proposed ship canal by that route, that the river sands in many places are rich in gold and platinum, and it is the purpose of the company which has sent out this expedition to work the river bed by a system of subaqueous hydraulic mining. In this way gold-bearing sand and gravel, at depths too great to be reached in the ordinary way, will be sucked up by steam machinery and the precious metal separated by washing. The machinery, devised by Mr. Samuel S. Webber, was built by the Herreshoffs at Bristol. The expedition appears to be well organized and capably officered. If it succeeds the venture is likely to be followed by similar assaults on other gold-bearing river beds whose wealth has been out of reach hitherto. The Atrato is the most westerly river which flows northward in South America. It drains a long reach of auriferous country and empties into the Gulf of Darien.

THE TECHNOLOGICAL, INDUSTRIAL, AND SANITARY MUSEUM OF NEW SOUTH WALES.

The World's Fair at Sydney has led to the establishment in that rising city of a museum devoted to technological, industrial, and sanitary matters. It is intended to contain typical collections of all materials of economic value, representing every stage of progress from the raw material to the manufactured product, with processes, machinery, and so on. Its scope includes every variety of animal products of use in the arts, vegetable products, waste products, and foods; specimens of useful and injurious insects and other representatives of economic entomology; economic geological specimens representing the products of mines, quarries, etc., in every stage of preparation and manufacture; educational apparatus and appliances; sanitary and hygienic appliances and systems; machinery and tools of every sort; models, drawings, and descriptions of patents, especially such as are likely to be of use in the colony; specimens of ethnology; ancient and modern industrial art work, with copies, photographs, etc.; exhibition catalogues, trade journals, price lists, and other vehicles of industrial information.

The project, if properly carried out, cannot fail to be of great educational and industrial value to the colony. It may furnish also an advantageous means of placing before the people of the colony specimens of tools, machinery, manufactured articles, or industrial processes likely to find a market there. The trustees of the Australian Museum, under whose direction this special museum is being formed, solicit contributions of trade journals, price lists, catalogues, and specimens of raw materials and manufactured articles likely to add to the interest of such a museum.

Our merchants and manufacturers who may be charitably inclined, or who may be seeking an extension of their trade with Australia, will find in this museum a convenient and comparatively inexpensive way of benefiting their Australian cousins, or of keeping their goods in a favorable position before the people they wish to trade with. No expense will be attached to donations, the trustees undertaking to pay freight and other charges on the arrival of the goods in Sydney.

The Erie Basin Dry Docks.

It is announced that the Erie Basin Dry Docks, which were recently purchased by the president of the Balance Dry Dock Company, are to be pushed to speedy completion. It is intended to make both docks at least 600 feet long, thus making them the largest establishments of their kind in America. The new dock at Baltimore is but 450 feet long, and Cramp's Dock at Philadelphia 462 feet. The Erie Basin Docks will be divided by a pontoon into two compartments of 300 feet each, either of them being large enough to admit the Pacific Mail steamers. The object of this is to really double the capacity of the docks. If a vessel of 600 feet is to be admitted, the pontoon will be raised, but if two vessels of 300 feet each wish to enter, the one that is to undergo the most extensive repairs will enter first, the pontoon will be closed, and then the other will be admitted. The inner compartments may be closed for an indefinite period during a long job, while the outer compartment may at the same time be opened and shut to a number of vessels. It is said that to complete the docks will require an expenditure of from $300,000 to $400,000. When finished the docks will accommodate, with one or two exceptions, the largest merchant vessels afloat.

The Lick Observatory Telescope.

The trustees of the Lick Observatory have finally closed the contract for the optical part of their great telescope. There has been considerable doubt whether a refractor or an enormous reflector would be selected, but the decision is in favor of the former. The object glass is to be three feet in diameter, and the Clarks of Cambridge, Mass., are to make it for $50,000. The mounting for the instrument is not yet provided for. Proposals will be obtained from the principal instrument makers of Europe and this country. Probably the mechanical part of the instrument will cost as much as the optical. It may be three years before the telescope is finished. If the instrument proves successful, it will be the most efficient ever pointed at the heavens. Its power will exceed that of the Pulkowa glass by forty-four per centum, and it will be almost twice as powerful as the great telescope at Washington, which at present is the best of its kind.

The First American Railway in Asia.

The first section of railway built by Americans in Asia was opened for traffic the first week in January, just twelve months from the date of the order for its construction. The completed division is twenty-three miles in length. The line is from Otarunai Harbor, on the west coast, via Lapparo, the capital of the Northern Island, Yezo, to the Paroni coal fields. It cost $20,000 per mile, which includes rolling stock, motive power, machinery for terminal repair shops, etc. The English line built between Tokio and Yokohama cost nearly $200,000 per mile, and it took five years to complete eighteen miles. The Japanese officials are said to be greatly encouraged by the prospect of an American system of rapid transportation.

Stones Clinging to Under Side of Ice.

When the severe cold weather came upon us so suddenly in November last my attention was called to a curious phenomenon in the Susquehanna River here. Upon Thanksgiving Day, not far below the dam which crosses the river here, I noticed a large number of stones clinging to the under side of the ice. The river there was two or three feet deep, the ice at that time about three inches thick. The stones were the rounded river stones, and evidently came from the bottom of the river. They were of all sizes, up to those weighing probably two pounds.

The phenomenon is not a new one, but it was displayed here upon so large a scale, and the conditions accorded so perfectly with those that the scientific explanation demands, that it seems to be worth while to call attention to it.

More than two hundred years ago Dr. Plot, of Oxford, England, described similar occurrences in the Thames, and gave at least a partial account of their true cause. It is well known that water, like most other substances, contracts under the influence of cold until it is reduced to a temperature of 39°. But if its temperature is lowered still further it *expands* until reaching 32°, when it freezes, by which its bulk is increased much more than by its cooling from 39° to 32°. Hence it is that water begins to freeze at the surface, since, when near the freezing point, the coldest water, being the lightest, is found upon the top, and it is that which freezes first.

But when the weather is very cold, and the different parts of the stream are thoroughly mixed by rapids or some such mechanical action, the water may be about the same temperature at all depths, and be lowered altogether nearly to the freezing point. In this case the water will *begin to freeze at the bottom*, because it is stiller there, and perhaps because the stones and bottom have lost some heat by free radiation and by contact cool the water. Although so much lighter than the water this ice would not rise as soon as formed, for it would be frozen fast to the bottom and the stones lying upon the bottom. But as soon as its size gave the cake of ice buoyant power enough it would tear itself loose from the bottom and the larger stones and rise to the surface, carrying with it the smaller stones and gravel. Then it would be frozen in with the surface ice, keeping its curious load frozen fast to its under surface.

In November the weather suddenly became very cold, the thermometer sank to 3°, and the river here was frozen over in one night, a very unusual occurrence. Moreover, the place where the phenomenon occurred was just below the dam, where the current was swift and the river rather shallow. All of these would tend to mix up thoroughly the whole mass of the water. These circumstances seem to show the above to be the true explanation.

In the Thames stones weighing as much as eight pounds have been known to be raised up from the bottom of the river in this way. Under favorable conditions, and acting through a long time, the ice by carrying these materials down streams must cause geological effects which are not inconsiderable.

G. M. PHILIPS.

Lewisburg, Pa.

The Expansion of Steam.

To the Editor of the Scientific American:

Page 321, last volume SCIENTIFIC AMERICAN, contains an article on "The Expansion of Steam," by Prof. Thurston, and page 360 one from William D. Marks, Dyn. Eng., etc., on the same subject. Quoting little from either, allow me to say that steam or any gas in expanding *does* trace a *strictly* mathematical curve of pressure. But it is *not* an "equilateral," or any other sort of hyperbola. The Boyle and Mariotte law, that the "pressure by the volume gives a constant product" is identical with one of the equations of the hyperbola ($xy = M$). But this law will only hold good upon the *impossible* condition that the temperature remains constant. In the equation of the hyperbola there are only two variables or factors—in the true curve there are three, corresponding respectively to the volume, the pressure, and the temperature of the expanding gas; and the equation of this curve *exactly* expresses the relation of the volume, pressure, and temperature of saturated steam or any gas, although each gas traces its own curve from the fact that the variable expressing temperature must be assigned a value corresponding to the specific heat of the gas considered. To find the pressure at any given point in the stroke of the engine after cutting off, let the practical engineer compare the volume (including clearance) at the given point with the volume at cut-off point, and from the tables in any book on modern steam engine he can find the corresponding pressure (always counting the atmospheric in addition to gauge pressure). An engine should expand the steam only so far as that the direct pressure on piston will exceed the back pressure to not only overcome the friction of the engine, but also the resistance of the driven machinery, and perform an appreciable amount of useful work besides. Prof. Thurston's formula is only claimed to be approximately true, while Mr. Marks is neither approximately, theoretically, nor practically correct.

B. F. MCKINLEY.

Lexington, Ky.

Professor Watson's Successor.

Prof. Edward L. Holden, of the Naval Observatory, Washington, has been appointed to the place in the directory of the Washburne Observatory at Madison, Wis., made vacant by the death of Prof. Watson.

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