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THE SCIENTIFIC AMERICAN SUPPLEMENT,

No. 485,

For the Week Ending April 18, 1885.

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WAR BETWEEN ENGLAND AND RUSSIA.

The capture of Penjdeh by the Russians, March 30, seems to put an end to peaceful negotiations concerning the disputed boundary of northwestern Afghanistan.

Though occupied by Afghans, Penjdeh lies in a region claimed by Russia to have belonged to its lately conquered neighbor, the Amir of Bokhara, and therefore should be surrendered to the conqueror. This claim was disputed by the Afghans and their allies, the British, and a survey commission had been appointed to examine the ground and fix the proper boundary, an agreement having been come to that neither party should move until the question was properly settled. Whether the conflict was provoked by the Afghans, as the Russian commander alleges, or was a sheer breach of faith on the part of the Russians, as the English assert, does not much matter. The war is actually begun, and it seems to be mainly a question of promptness and dash whether the Russians are able or not to settle the frontier question as they will, at least for the time being.

The nominal northern boundary of Afghan Turkestan, as shown on English maps, runs almost due east from Sarakhs, near the northeastern corner of Persia, to the southernmost bend of the Amu Daria, and thence along that river to its sources in the mountains of Hindo-Koosh. In the west that line crosses a desert region, without fixed inhabitants, and always in dispute between the semi-independent tribes of the ill-defined political border between Afghanistan and Bokhara. More than twenty years ago Prince Gortschakoff, speaking for Russia, said that the fleeting sand grains of the steppes were incapable of forming a frontier line, and that only the inhabited and arable part of the country would answer for a solid line of demarkation. The Russians have been pursuing that phantom "solid line" across the steppes until they have pushed it across Khiva, Bokhara, and Kokhand to the mountain frontier of Afghanistan proper.

The old frontier of Afghan Turkestan through the desert did not fulfill the prescribed conditions, and a better one was demanded, running east frem Zulfirkar Pass through Akrobal and Bala Murghab. The English and the Afghans were willing to compromise on a line some forty miles further north, a line which would give the Afghans command of the mountain passes leading into their country; but the forcible advance of the Russians has probably put an end to all discussion of the matter, and only a stubborn war will determine whether the Russians stay their course for the time north or south of the mountains, on the Turkoman side or along the fertile valleys of Herat and Cabul.

The latest battle ground lies near the junction of the Kushk River with the Murghab, which streams drain the northern slopes of the mountains, and flowing to the northwest water the oasis of Merv, about 100 miles north of Penjdeh. There they are lost in the sands of the desert. The mountains are that prolongation of the Hindo-Koosh known as the Koh-i-baba, forking into three ranges westward under the general and very ancient name of the Paropamisis.

The Murghab River, the upper valley of which has never been explored, rises between the first and second range. The Heri Rud, or River of Herat, drains the valley between the second and third ranges, the middle range being much the highest, rising in places to 20,000 feet above the sea. The upper valley of the Murghab is inclosed by high mountains, and is said to be fertile and well watered. Its inhabitants are Mongol Hazards. At the foot of the mountains, near Bala Murghab, where the road from Maimana to Herat passes, the river runs through a narrow defile. At Penjdeh, about forty miles below, it enters a broad valley, which gradually opens upon the plain of Merv.

The Kushk flows more directly northward, through a narrow valley traversed by the direct road from Penjdeh to Herat—the best route from Central Asia to Herat and the heart of Afghanistan. It is along this route that the Russian advance will most likely be made. Robat Pass, 45 miles north of Herat, leads from the valley of the Kushk into the valley of the Heri Rud, and is where the severest fighting is likely to occur if the Russians meet with serious resistance north of Herat. Here the Amir of Afghanistan is said to have concentrated a considerable force. At other points, east and west, the mountains are said to be practically impassable by troops. There is, however, a fairly good road along the Persian frontier, and a Russian force is reported as advancing toward Herat by it.

To meet the advancing Russians, the English are said to have 30,000 men at Rawul-Pinde, to the southeast of Cabul and Peshawar, on the Indian frontier; 27,000 men on the road from Quetta, on the southwestern frontier, to Candahar; and 35,000 at Quetta. But before either of these forces can be brought into action the Russians have ample time to seize Herat if they wish to.

The distance from the Russian base at Michaelsvitch on the Caspian Sea to Saraks is about 400 miles, part of the route being covered by a military railway. From Saraks to Herat, as a bird flies, is about 100 miles, the actual route being probably double that distance.

Herat has a population of about 50,000, and is the capital of the province of the same name. It is situated in a fertile plain 2,500 feet above sea level. The plain is watered by canals from the Heri River. The city is 360 miles due west from Cabul, the capital of Afghanistan, and about 200 miles southeast of Merched, the principal city of Persian Khorassan. From a military point Herat is of great importance, as it commands the only route for an army from the northwest to Hindostan. For this reason it has been called the Gate of India. The city has been a strongly fortified post from the earliest times, and recently its defenses have been strengthened to meet the requirements of modern warfare. Candahar, the next place of importance on the route to and from India, is 265 miles southeast of Herat, and has a population somewhat greater. It is fortified, and is a place of considerable manufacturing importance. Cabul, about the same size, is 120 miles west from Peshawar, on the Indian frontier, and 200 miles northeast from Candahar.

LATHE FITS.

In a shop visited recently, workmen were setting up an engine and pumps for utilizing ammoniacal vapor for cooling purposes. The castings were of fine charcoal iron, melted in the cupola by the nicest of coke, and run into moulds made by the most expert workmen. They turned and bored "like old cheese," as one of the enthusiastic workman declared; they were really very elegant specimens of the capabilities of cast iron. The boring and turning were worthy of the character of the iron—perfect. While looking at the process of ultimate "assembling," it was noticed that a workman could not induce the piston in a cylinder to move by quite energetic coaxing, and it was necessary to turn the eccentric shaft and shift the valve before the piston would budge. This was a fit; and it was done in the boring machine and on the lathe, with no packing rings on the piston! Here was fine work; how much of it is done in our best shops? When it was suggested that it was "too fine," facts were given from recent experiments that proved that, either with steam or with the highly attenuated ammoniacal gas, the closest fits of the initial work are the best; giving not only the best results at the start, but the best during the wear of actual service.

In cylinder boring, scraping to fit is not reasonable; neither can a piston—head, follower, or rings—be properly scraped by hand to fit; this work must be done in the lathe or the boring machine. But very exact work may be done in the lathe without recourse to hand scraping. None of it, however, can be done by the file. It is outrageous that the file should still be permitted on turned work in the lathe. Even in well managed shops this abominable practice is permitted The variations in the density of metals, and those in the handling of the file, preclude the possibility of filing a turned cylinder true. Where perfect fits are required in the lathe, as plugs for template gauges, nothing can be more exact than the grindstone, the emery wheel, or the corundum wheel, used in a grinding lathe or in an ordinary lathe with the grinding wheel mounted on the tool carriage. But some jobs will not pay for this trouble.

Very good fits may be made in the lathe by the square nose tool and water or oil. This is known as the "water polish;" but it is a polish only incidentally—it is a finish really. For doing it properly the tool should be a square nose tool, but with rounded corners—a tool with a face of one-quarter of an inch, perhaps more, ground perfectly straight across, but with both corners slightly rounded by being rubbed on the oilstone; not enough to be noticed by the eye. The size of the work before this tool is used should be as near the finish as possible, shown by springing a pair of calipers over it, as the object is only to clean off the ridges left by ordinary turning. If properly done, the water polish will leave a piece of lathe work so nearly perfect that it will not only appear to be smooth to the eye, but it will respond to the "feel" of the calipers, and even the finger touch will fail to detect rings and ridges.

American Tin.

The district in which the deposit occurs is a grand uplift, the highest point of which is Harney's Peak, 7,443 feet above the sea level. The superincumbent strata have been eroded so as to expose the tin bearing stratum, and that itself has been subjected to erosion until large placer deposits have been made around the foot of the peak, yielding stream tin, or concentrate, of great richness. Since May last the Harney Peak Company, of this city, have been engaged in sinking shafts, running tunnels, etc., to ascertain the extent of the deposit, while Professor G. E. Bailey, in a laboratory erected upon the spot, has been employed in making tests of the character of the ore. The developments have been so satisfactory to the company that they have just closed a contract for a sixty stamp mill to be erected at the mines.

Professor Bailey read a paper recently before the New York Academy of Sciences, embodying the results of his observations.

Geology of New Jersey.

Professor George H. Cook, for many years State Geologist of New Jersey, in his annual report for 1884 presents a good deal of most interesting information, but in his work the Professor never loses sight of the practical, assuming that "whatever will turn its products to practical use may be the subject of its descriptions; whatever will help to make these natural resources known to and understood by the great body of the people comes within its bounds." The work of the past year was devoted to making good topographical and geological maps—of which those already issued are beautiful specimens of the most careful and comprehensive workmanship—to intricate problems of structural geology, and to questions of water supply, drainage, and other topics connected with economical geology, such as iron mines and mining industry, statistics of iron and zinc ores, etc.

One chapter of the report which will attract especial interest is that treating of the fine exposure of basaltic rock, in beautiful prismatic columns, on the southeastern slope of Orange Mountain, which was much talked of last summer. It was made in quarrying material for road making, for which this tough and heavy rock of igneous formation is particularly adapted, and there is now exposed a vertical face of rock 700 feet long, 30 feet high at one end and about 20 feet high at the other. The columns are as regular in their form as if they had been dressed out by a stonecutter, are generally parallel to each other, and packed together so closely that there are no vacant spaces or openings, the surface of most of them being marked as if they were regularly laid up in courses like bricks in a building. These courses are about as thick as common bricks, and have about the same inequality or unevenness of surface that buildings of ordinary brick have, the courses in adjoining columns matching each other; but they do not extend inward to affect the structure of the rock, as in breaking across the courses no traces of them can be seen in the solid and hard rock. Accompanying the report are some fine views of these basaltic columns, as photographed by Mr. H. J. Brady, of Orange.

Professor Cook also gives the details of the uncovering of the buried swamp of small white cedars near South Amboy the past summer, some twelve feet below where chestnut, oak, and other common timber had been growing, as showing a remarkable instance of geological change since the country has been inhabited by white men, and thus calls attention to the remarkable form of the ocean bottom off the New Jersey shore: "To look at it as a whole, it appears as if the real shore of the ocean was one hundred miles out from the eastern border of our State, and the intervening distance was only temporarily covered with water, like flat grounds on the borders of a river in time of a freshet. . . . For the first 100 miles out the ocean deepens only three feet to a mile, or 300 feet in all, while at 118 miles from the shore the bottom has dropped to 6,000 feet, and at 250 miles is over 12,000 feet, or nearly 2½ miles deep." The appearance, he remarks, is almost as if these shallow shores "might soon be left dry, and the ocean diminished to the area of its deep waters. Such a contraction of its area would diminish the capacity of the ocean but slightly. And looking at it in the opposite direction, it would require but a small addition to the enormous volume of its waters to make them flow inland far enough to cover the whole of southern New Jersey and all those strata which now seem to run so regularly out to sea."

Migration in Florida.

BY E. M. HASBROUCK.

The great tide of migration has turned, and the vast army of birds that annually go north are now *en route* for their breeding grounds.

Of all localities in which to study migration perhaps that of Palatka is one of the most fertile; here it commenced fully a month ago, when the yellow-rumped warbler, heading the van, was first noticed, Feb. 8, in sparse numbers in the woods and among the trees about the town.

Unfortunately, I was not enabled to get out again until Feb. 21, when I found them in immense numbers scattered through the swamps, woods, orange groves, along the roadways, and even hopping about on the doorsteps, and peeping into the windows from the slats of the blinds. They spent their time busily engaged in catching insects, and I have often seen them balancing themselves on their wings like humming birds in front of flowers to catch the insect within.

They remained scattered until about March 18, when they began to gather in large flocks, still, however, frequenting the open places, were they could be flushed like quail, alighting again within a few rods. They soon began to leave, and by March 24 were nearly all gone, and at this date—March 28—only a few individuals remain where five days ago were thousands. The next bird to arrive was the chipping sparrow, who did not put in an appearance until Feb. 21, when in the evening I flushed quite a large number from the scrub palmetto where they were roosting; this is the only instance I have recorded of its being here. Henslow's bunting also put in appearance Feb. 21, in the shape of a hand-some male specimen; I started him out of some short grass on the edge of a small lake, and after flying a few feet he "pitched" after the manner of woodcock, and squatted flat in the grass; fortunately I could see him quite plainly, and noticed that his wings and tail were spread, and his head turned toward me with beak partially open, much after the fashion of night hawks in attempting to decoy an intruder from the vicinity of their eggs or young by feigning lameness. I have not seen one since, and think them to be quite rare here. On March 4 the weather changed to warmer, cloudy, and inclined to rain, with due south wind, bringing three purple martins, the first of the season; they spent the day in circling over the town, and were observed again on the following day.

On March 5 I was called away, and did not return until the 26th, when I found considerable numbers flying over the town. The next bird that came under my notice was the cat bird; although I have met with them occasionally during the winter, they did not begin to appear in any number until March 11, when they were quite numerous in the bushes bordering the banks of streams, and in most of the thickets. Although I did not make note of it at the time, I think I heard one individual attempt to sing, but he did not make a success of it; they, however, were constantly uttering their plaintive cry, from which they derive their name. The blue yellow-backed warbler also put in appearance on March 11, late in the afternoon, in the shape of a single male bird, which was found in an orange grove. During the night the weather moderated, and on the following day, March 12, passing through the same grove, I succeeded in finding eight of them.

Between the nights of March 11 and March 13 a strong warm wind sprang up from the south, bringing with it large numbers of these birds, and on March 13 they were numerous, not only in the groves, but in the woods and swamps. Up to this time I had heard no song, only a single "chip" being repeated at intervals as the birds hopped from limb to limb in search of food; but I now began to detect a faint warble uttered occasionally between the "chips," as though the birds were just commencing to tune up, but they were not in full song until March 25, when they were as numerous as the yellow rumps had been before them, and could be heard singing in every direction. They are still here (March 30) in large numbers, though gradually working their way northward. The same warm wave that brought in the blue yellow-backs proved to be favorable for other species, for on the same day I noticed the first ruby-throated humming bird, a single male specimen being seen in the woods around the wild honeysuckle; also the black and white creeping warbler was seen in the swamps to the number of four, and as usual were busily running up and down the tree trunks in search of insects. The humming bird I continued to see until March 23, when they appeared in considerable numbers in the woods and swamps, and at the present date, March 29, they are very common about the gardens and orange trees.

The creepers continued to increase until March 24, when they were and are still very common, both in the woods and swamps and in the groves. On March 16 the Maryland yellow throat (although here in considerable numbers throughout the winter) began to be more common, and for the first time since coming south in October, I heard him utter his song. It proceeded from the depth of a thicket, and as I did not at first recognize it, I made a careful search until I discovered its source. At present date, March 25, they are not common, but more numerous than previously, and their song is often heard. The white-throated sparrow also appeared on March 16, four or five being seen in the bushes, along the water courses. I only heard a single "ch-e-e-p" uttered occasionally, and do not think they get into song until they arrive farther north. Their plumage also is less brilliant here than when it first appears in the Middle States, especially the white stripes on the head, which are tinged with brown.

The next bird I have recorded is the swallow-tailed kite, when on March 18 I noticed three individuals circling high in the air over the swamps. I did not see them again until March 21, when I saw four in the same place, but flying low down, and making frequent swoops toward the earth with loud screams. On March 23 I noticed what I took to be the first sign of the approaching migration of the mourning dove, viz., the "cooing" of said birds. It is a well-established fact that these birds on their arrival in the Middle States are "cooing," and almost the first intimation we have of their presence is the sound of their notes in the woods and orchards. It is also known that these birds "coo" *only during the mating and breeding season*, and the rest of the time they are *silent*.

Putting these facts together with the fact that they are "cooing" here leads me to think that these birds (which have been wintering here) are about to start on their journey north. On March 23 I noted also the first hooded warbler; he was among the young trees on the edge of the woods, and was so shy that I could not secure him; but on the following day, March 24, I secured two handsome male specimens in the same place, and saw a few more in the woods and swamps, all low down near the ground, busily catching insects. The yellow-throated warbler also arrived on March 23, and was represented by a single female specimen, which I secured as she was hopping about the branches catching insects, and on the following day, March 24, I secured two more females, not seeing a single male bird, whereas all the aforementioned birds of each variety were males, not a single female recorded as either having been secured or seen. March 24 two more arrivals, viz., the painted bunting and the tufted titmouse, each being represented by two individuals, of the former one male and one female, and of the latter two males. The titmice were shot out of the branches of the trees in the woods, where they were catching insects and occasionally uttering a note that very much resembled that of the black-capped titmouse of the North. The buntings were in some scrub on the edge of the woods, and although I failed to secure either of them, yet I saw them distinctly enough to identify them fully.

For March 25 I had no new arrivals until late in the evening, when, returning from the swamps, I heard the first whippoorwills, and distinctly counted five birds, all singing in different parts of the woods, and at the present date, March 29, large numbers may be heard every evening. Different notes come from different birds, as, for instance, the note of one will be in a higher tone than that of another singing within a few rods of him.

Since writing the above, a friend brought me a fine specimen of a male prothonotary warbler, which he secured on March 25, it having, as he claims, flown against the window and killed himself, thus making two arrivals for March 25. The above notes carry me up to the present date, March 30. It will be noticed that I have said "up to present date" several times, each time giving a different date, the term "present date" applying only to *that* species.

A New Industry.

Porpoise fishing for the oil alone has been carried on for many years off the North Carolina coast, but last summer a company was formed with its headquarters at Cape May, N. J., not only for trying out the oil, but for utilizing the hide. The process of rendering the oil is very simple, and the average amount obtained is from 6 to 8 gallons. The experiment made last summer by this company proved quite successful, $3,740 being realized, it is said, from an outlay of $1,000 in five weeks' fishing, and its facilities for taking porpoises will be greatly increased the coming season. The skin of the porpoise makes a very superior, soft, and pliable leather, and the estimated value of each individual for its oil and skin alone was placed at $20. Last autumn it was discovered that the flesh made quite a savory dish, and it became so popular at the fashionable watering places along the coast that a Philadelphia firm recently made a proposition to take all that may be caught along the coast this season, with the view of working much of it into mince meat. The Cape May company, it is said, will reject the offer, as it already has offers from prominent Philadelphia and New York hotels and restaurants, and it is believed that there will be a demand for the meat which cannot be met.

The meat is red and juicy, and resembles in appearance beef, but is more solid, finer grained, and very tender; much more like venison, which it resembles in flavor. They are taken in seines about 1,000 feet long and very wide, and when captured, if not already drowned, are killed by stabbing with knives. It would seem that the outlook for the success of a new and valuable industry being established along our coast was most excellent.

Chemical Process for Ramie.

A chemical process by M. Reynaud, of St. Denis (Reunion), consists in the employment of a solution obtained by lixiviating ashes of wood, or even of the woody part of the ramie, and therefore it is a cheap process, since this woody part, besides serving for heating purposes, leaves an ash which is utilized in the process. The ash, after being treated with so much hot water to give a cold solution showing 1·025° to 1·030° specific gravity, is immersed either in the natural state or, better, slightly broken up by means of a wooden roller. After some time, varying according to the maturity of the fiber, it is taken from the bath, and the ramie is immersed in cold water; then each stem is taken separately in the left hand, and worked on and back between the index and thumb of the right hand, when by this simple pressure the skin and a large quantity of the gummy substance can be removed. The fibers are thus obtained divided to a large extent, and are found floating about in water. It is now only necessary to take them by the right hand, and to separate the fiber without any effort whatever from the wood. The separated fibers are now brought back into the original ash lye and left there for a few minutes, then well washed in running water, and finally dried in the stove or in the open air. It is easy to ascertain when the stems have been long enough in the bath by taking one out and trying it; when the skin is easily removed, then they can be taken out. The same bath can be used several times.