"I saw dates on the part exposed from 1800 to the current year, the number of last year being much the greatest over the favorable surfaces for marking; and, when these were found, the double or treble use in some instances was noticed.

"After having actually gotten on to the rocks, and discovered what they were and how to distinguish and copy them, it appeared, that with the exception of a very few characters recently dug or chipped out by lumbermen or visitors, almost always initials, the only interesting or ancient portions were scratchings, which could be made by any sharp instrument on soft and polished slate. The rocks were great drawing-slates, affording a temptation to any idly disposed person to scratch. Happening to have with me an Indian stone arrow which had been picked up in the neighborhood, I used that upon the surface, and it would make as good scratches as any upon the rocks, except the very latest, which were evidently cut with metal knives by the whites. The time in which I was actually at work in taking copies was very short, only parts of two days; and then a violent storm arose, which continued for several days, during which time it was impossible not only to see the faint scratchings which were of interest, but even to move over the rocks, as they were rendered as slippery as glass by the moisture; and then I was forced to leave for Washington.

"The mode in which I took the copies was by running over and through their outlines with a blue aniline pencil, and then pressing a wetted sheet of linen or paper upon them, so that the impression was taken as by print. Purposely, in order to experiment upon a successful mode of getting the copies, I made my first work upon those that were of least apparent interest, *experimentum in corpore vili*, so that I should not by my operations spoil those which were of more importance. The main object which I had in the examination of the inscriptions was to ascertain whether there were upon these rocks any of the more simple and more probably aboriginal characters that are found in the hieroglyphs of Kauder. In the short time that I was at work I discovered certainly two of the characters what were in Kauder's work. Both of these are similar to, but not identical with, symbols of the Roman Catholic Church.

"It still remains undetermined whether those particular characters were imitated by Indians during the last two hundred years from religious symbols collected by Kauder, or whether those religious symbols had been adapted from some characters which had previously been in use. A more extensive examination and study of the characters on the rocks, of which probably there are thousands that I did not copy, or indeed carefully examine, would be necessary before it could be determined to verify my hypothesis that the scratching of symbols on these rocks would be explanatory of the Micmac printed hieroglyphs.

"On one point the peculiar multiplication of the characters affords an index to antiquity beyond what is generally possible. The existence of two or three different sets of markings, all visible, and of different degrees of distinctness, is in itself important; but, in addition to that, it is frequently the case that the second and third in the order of time have associated with them dates, from which the relative antiquity of the faintest and dateless can be to some extent estimated. The third and most recent class of dates are English names, and are associated with the forms of English letters; the second class are French names, and in some cases have French designs.

"There is an interesting story on this subject which was communicated to me from Louis Labrador, whose great-grandfather, old Ledore, according to his account, piloted a body of French Acadians, who, at the time of the expulsion in 1756, were not shipped off with the majority. They escaped the English, and travelled from the valley of Annapolis to Shelbourne, at the extreme south-east of the peninsula, and were on their way from May to October. During that passage they halted for a considerable time to recruit in this beautiful valley along the Kejimkoojik Lake, the very spot where these markings appear, and which was on the ancient Indian trail. It is exceedingly probable that the French would have been attracted to scratch on these fascinating smooth slate surfaces whether or not they had observed previous markings, but it seems evident that they did scratch over such previous markings. Therefore the latter antedated the middle of the eighteenth century.

"One of the printed impressions taken in the manner before mentioned is of a bat between an armed brig and troops or Indians on land, which might have been one of the several naval expeditions against the Acadians; as, for instance, that of Argall in 1614, or Cromwell's of 1654, and which was etched as of historical interest by the French wanderers at the time mentioned. The rig of the vessel has not been used for at least a century, and the 'top' where men are shooting at those on shore reminds of the old sea-fights under the Stuarts. The artist has drawn his brig down to the keel without reference to the displacement of water or to perspective, and afterwards superposed the shore-line and its defenders.

"The other impressions, copied on linen, and presented to show the character of the work on the rocks, but by no means its intrinsic value, are a peculiarly drawn star appearing many times in Kauder's book, though five-pointed instead of seven, — a dragon-fly with some fainter characters. A grotesque group — probably a French caricature — is two eels, and two birds perhaps intended for herons.

"Other impressions taken by me on paper, and mounted on cardboard, show a small star of the same character as before given, but five-pointed, some faint designs resembling those of Kauder but not identical, an animal supposed to be a bear, an aboriginal head and bust, a very artistic moose, and a cluster of three trees differentiated at their roots, and conjectured, by comparison with a Passamaquoddy inscription, to signify the first, second, and third chiefs of the tribe.

"In connection with the scratchings on the soft and polished surface of the rock, which seems to invite them, the thought occurs that the art of picturing, and subsequently of writing, is in all parts of the world determined by the ready and convenient material; as, for instance, the papyrus of the Egyptian, and parchments in other parts of the ancient world; the hides of deer or buffalo among the hunting tribes of this country. But the most tempting and convenient of all material appears to have been the birch-bark, which is found generally through the whole of the northern Algonkin region. This can be used in two entirely distinct modes, — one in which outlines are drawn by any hard-pointed substance on the inner side of the bark when it is soft, and which remains indelibly when dry; the other made by scraping on the rougher outer surface, thus producing a difference in color."

The New Naval Observatory.

The contract for the erection of the new Naval Observatory buildings, on Georgetown Heights, near Washington, has been awarded by the secretary of the navy for $307,811. This contract does not cover the piers or the domes, which are to be built by experts under the direct supervision of the observatory officers. There are to be nine buildings in all, including the main building; the great equatorial building, where the great telescope will be mounted; the clock-room, where the observatory clock will be set up and the naval chronometers kept and corrected; two buildings for observers' rooms; the east and west transit buildings; and a boiler-house. The material used will be Tuckahoe marble. Work is to be begun immediately, and the buildings are to be completed within eighteen months.

ELECTRICAL SCIENCE.

Electric Launches.

MR. RECKENZAUN, of the Electric Accumulator Company, has fitted up a small launch, to be run by an electro-motor supplied with electricity from secondary batteries. The launch has no features of especial novelty, excepting the fact that it is the first boat propelled by stored electricity that has been used in this country. A full charge of the battery will take her about eighty miles; and she can be more easily controlled than an ordinary launch, besides being noiseless, and free from heat and dirt. In speed, weight, and the distance she can go, she compares favorably with steam-launches of the same size, while in point of comfort she would far surpass them. There is a field for these boats at present on men-of-war for general use, or for torpedo-boats, for which last purpose their noiselessness makes them especially valuable. They could

be used, too, on larger yachts, and for pleasure-boats by those who can afford them, and where there are facilities for reaching the battery. An important use just at present is to call attention to the possibilities of storage-batteries, and to encourage inventors to improve the present uneconomical and weighty types.

The launch in question is twenty-eight feet long, has six feet beam and a depth of three feet. The batteries are under a couple of benches running fore and aft. The motors are under the deck aft. The motors are governed by a handle near the steering-wheel. With seven-horse power the boat is said to make twelve miles, with two-horse power about six miles, an hour.

COST OF ELECTRIC TRACTION. — The following table is the result of calculations made by experts on the cost of horses, cables, and electric storage-cars on the Fourth Avenue street-car line, New York: —

	Electric.	Horse.	Cable.
Cost of cars	1	.54	.81
Motive power	1	1.45	1.06
Construction of roadway	1	.53	2.09
Depreciation and repairs	1	1.47	2.04
Operating expenses (including wages)	1	3.38	1.71
Total	5	7.37	7.71
Average	1	1.47	1.55

For this road, then, storage-cars would, provided the estimate be correct, be much cheaper than any other system. Fortunately, these figures will have a practical test, since the Julien Company is equipping ten storage-cars for the line. So much for storage-cars. Where overhead wires are permissible, there seems no doubt of the advantages of electric traction. The Union Passenger Railway in Richmond, with the Sprague system, is carrying over 250,000 passengers a month, at a cost of less than 1½ cents a car-mile; the total operating expenses, every thing included, being only 47 per cent of the receipts. What electric railway systems using a conduit between the tracks for their conductor can do, remains to be seen. For haulage in mines, the reports are most encouraging. Mr. Shaefer, at a meeting of the Engineers' Club of Philadelphia, stated that the cost per ton-mile in the anthracite-coal mines was as follows: mules, 1.82 cents; steam, .6 cent; electric motors, .4 to .67 cent. Considering the very obvious advantages of electricity as compared with steam in mining-work, the figures are strongly in favor of electricity for traction in mines. Outside of cost, electricity presents the advantages of cleanliness and perfect control; and the above figures, taken in two cases from actual and continued experience, show, that, when properly applied, it is superior in economy as well.

LIGHTNING-FLASHES. — W. Kohlrausch has estimated the current and quantity of electricity in a lightning-flash. He calculates that it will take 9,200 ampères to melt a copper rod of 2.5 centimetres diameter. Such a current concentrated in a flash would contain from 52 to 270 coulombs, which would decompose from 5 to 25 milligrams of water, and form 9 to 45 cubic centimetres of explosive gas. If this energy were stored up and distributed for electric-lighting, it would require from 7 to 35 flashes to keep one incandescent lamp lighted for an hour.

AN ELECTRO-CHEMICAL RADIOPHONE. — The *London Electrician* gives an abstract of a communication to the Académie des Sciences by MM. Chaperon and Mercadier, describing a galvanic cell made by them which is sensitive to the action of light. "It consists of a plate of bright silver covered by the electrolysis of sulphate of sodium with a thin layer of sulphide of silver, immersed in some electrolyte other than an alkaline sulphide, water containing a trace of sulphuric acid being as good as any thing. The electro-motive force is feeble and variable, and the cell polarizes rapidly, but its current undergoes an instantaneous change when exposed to daylight or even to weak artificial light. The authors investigated the rapidity of action by exposing the cell to the beam of the oxyhydrogen light, made intermittent by passing through a revolving wheel pierced with holes. A telephone was included in the battery circuit, and sounds were produced so high in the scale as to correspond to more than 1,000 vibrations a second, which showed that the electro-chemical effect must be produced in less than $\frac{1}{2000}$ of a second. No corresponding change was produced in the resistance of the cell: so the effect of the light must be to cause a variation in the electro-motive force.

EXPERIMENTS ON THE ELECTRIC ARC. — The fall of potential in the electric arc has been generally held to be due to two causes, — a resistance increasing with the length of the arc, and a counter electro-motive force independent of the length. This may be expressed by the formula $E = a + bl$, where a and b are constants, and l is the length of the arc. Dr. Lecher, in a paper in the *Centralblatt für Electrotechnik*, describes experiments which tend to disprove this view. He first found that the resistance of the arc does not increase very rapidly when it is extinguished: this he showed by putting the primary of an induction-coil in the arc-lamp circuit, first pulling the carbons apart, and second extinguishing the lamp. There was a spark in the secondary in the first case, but not in the second: so the resistance, on extinction, could not have increased with very great rapidity. This being the case, Dr. Lecher placed in the lamp-circuit a galvanometer, the needle held against a stop for the direct current, but free to swing in the opposite direction. He then suddenly cut out the feeding-current, and there was no swing of the galvanometer-needle in the opposite direction: so, if there was a counter electro-motive force in the arc, it must have disappeared at the same time the feeding-current ceased. To see if the difference of potential of the arc depends on the temperature of the carbons, they were heated by a blowpipe. With a normal difference of 42 volts, this rose to 48 volts when the positive, and 52 volts when the negative, carbon was heated. When the carbons are horizontal, the potential difference is less than when they are vertical, on account of the higher temperature in the latter case. When the carbons are cooled, the potential difference is less. For example, representing the difference by $a + bl$,

	a	bl	
Carbons horizontal, uncooled	33	$4.5l$	±1.5 volts.
" vertical, "	35.5	$5.7l$	±1.5 "
" horizontal, cooled	25	$5.0l$	±3.0 "

To find in what part of the arc the fall of potential really occurred, a carbon rod of small diameter was introduced into the arc, and the difference of potential between it and the carbon electrodes was taken. It was found that the difference of potential between the +carbon and *any* part of the arc was about 36 volts. This being the case, it is assumed that the rest of the fall of potential is at the —carbon. Dr. Lecher also experimented on the nature of the current forming the arc, but the method used is questionable. He claims that his investigations show: 1. The existence of a back electro-motive force is doubtful; 2. The difference of potential is affected by temperature; 3. If the negative electrode is platinum or iron, the discharge is discontinuous.

THE RADIO-MICROPHONE. — Mr. C. Vernon Boys has described before the Royal Society an instrument for measuring very small changes of temperature. "It is an extremely delicate form of thermopile, consisting of a square frame made of one turn of one square centimetre, of which three sides are thin copper wire, and the fourth is a compound bar of antimony and bismuth, each piece being $5 \times 5 \times \frac{1}{6}$ mm., soldered edge to edge. This frame is supported by a thin rod to which is fastened a mirror, and the whole is hung by a tortion fibre in the field of a powerful magnet. When radient energy falls on the centre of the compound bar, the frame is deflected, and the amount of deflection measures the energy. Adopting suitable dimensions, and using a very strong field, an instrument may be made capable of showing a change of temperature of the junction of one thousand-millionth of a degree."

BOOK-REVIEWS.

Forms of Animal Life, a Manual of Comparative Anatomy. By GEORGE ROLLESTON. 2d ed., revised by W. Hatchett Jackson. Oxford, Clarendon Pr. 8°. (New York, Macmillan, $9.)

THOSE who in years past have been familiar with Rolleston's 'Forms of Animal Life' will welcome the very much enlarged and modernized edition that makes its appearance after a lapse of seventeen years. Opinions may and will differ as to how the principles of comparative anatomy are best taught, but no one will deny