REMARKABLE EXPERIMENTS.

How Various Human Emotions May Be Recorded by Delicate Mechanical Devices.

Parents, teachers and lovers of children generally will be greatly interested in the results of an experimental study of no less than twenty-two thousand school boys and school girls, white and colored, just completed by the United States Bureau of Education. It has been a monster undertaking, requiring several years, as is shown by the first detailed account of the work.

All of the youthful subjects if grouped together would equal in number the men in the ranks of our standing army at the outbreak of the last war. The object of the investigation was to discover the relationship between parentage, surroundings, nationality, stature, weight, size and shape of head and other conditions and the conduct, intellect and health of children at different ages. Almost all of the subjects were selected from the public schools of Washington, the transient population of which includes nearly all American and foreign types of childhood.

For the case of each child was issued a blank calling for as many as 107 details, covering all facts and characteristics to be considered. All these data were collected by teachers in the various schools, under the direction of Dr. Arthur MacDonald, well known as an anthropologist, who personally examined cases demanding the use of instruments of precision.

Of such instruments, devised entirely for measurements of man, the Bureau has one of the most elaborate collections in existence. They automatically measure the relative acuteness of the senses, sensitiveness to pain and other stimuli, and the dimensions and motions of external parts of the body, besides keeping strict account of the changes in breathing and the distribution of the blood circulation under different conditions.

The extravagant theories of pseudo-scientists of the spectacular schools of phrenology must be abandoned for conclusions reached by such thorough work as this. No attempt was made to study the bumps of the youthful heads, yet the general dimensions of the cranium were carefully considered. One of the most interesting deductions is that broad-headed children appear to be brighter than long-headed children, the length of the head being measured from front to back of the cranium.

In estimating whether each head was broad, medium or long a simple formula was applied. The maximum width was always multiplied by 100 and divided by the maximum length. When the resulting numeral was 75 or less the subject was registered as long-headed, when between 75 and 80 he was medium and between 80 and 85 he was broad-headed.

Another interesting deduction is that the child with a large head is apt to be more intelligent than the one whose cranium is small. Diagrams made from the statistics show that as the circumferance of the skull increases so does mental ability. Children of laborers were found to have smaller heads than those whose parents work with their brains rather than with their bodies. Of all his measurements the anthropologist says he attaches most importance to those of the head. Defects of the cranium, says he, are probably more significant than those of other parts, and in general the nearer a bodily defect is to the brain the more important it is.

Can any relationship exist between a child's height or weight and his mental ability? was another question. The bright boys were found to excel the dull ones in standing height, sitting height and weight. A surprising discovery was that the children of the laboring classes, whose parents daily exercise their bodies, have a much smaller average for length of body and limb as well as for weight than those whose parents belong to the non-laboring classes and who gain their living mostly by mind work.

Another interesting conclusion arrived at is that a mixture of nationalities in the parents seems to result unfavorably to the mental development of the child. The result appears to be a reduction in the circumference of the head. Children of mixed nationalities were also inferior in weight, on an average.

Colored and white children were compared. The percentage of long-headedness appearing to indicate dullness when comparisons are made among children of the same race, was found to be twice as great among colored as among white boys, but this is believed to be due largely to the racial differences. Colored girls' heads seemed to be larger around than those of colored boys, the reverse of the rule with white children and to be shorter in stature although heavier in weight. The colored children were also found to be much the more acute in distinguishing temperatures.

The marks of "dull" and "bright" affixed by the teachers led to some further conclusions of great interest. Girls showed higher percentages of "average ability" than boys, but the boys showed the higher percentages in extremes. The boys were found to be more variable. Variability, the anthropologist says, must be regarded as an excellency. If an organism can vary itself it can adapt itself better to its surroundings. Children of the laboring classes were found to be inferior in their studies to those of the non-laboring classes.

An algometer was used upon the temples and palms of the hands to determine the least sensibility of different children to pain or to disagreeable impressions caused by pressure. The instrument is a brass cylinder with a steel rod entering one end. The rod is attached inside to a spring with a scale and marker measuring the degrees of pressure in grammes. The object was to discover how much pressure could be borne before the least pain resulted. Girls were found to be much more sensitive than boys, and girls in the public schools showed less sensitiveness than those in the private schools.

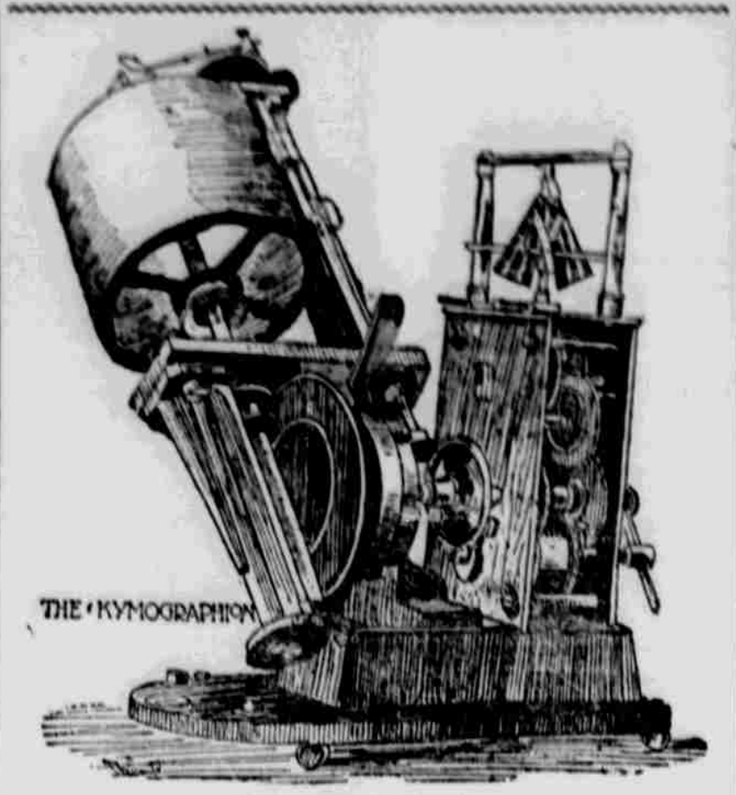
It was concluded that in boys sensitiveness to pain decreases in the order of their birth, whether first born, second born, etc., but the reverse seemed to be the case with girls. Boys with light hair and eyes were found to be less sensitive than boys with dark hair and eyes, the same being true of girls. Bright boys and girls at the same time appear to be more sensitive than dull boys and girls. Dr. MacDonald is of the opinion that luxuries and refinement increase this sensitiveness in people in general.

Children of the non-laboring classes were found to be twice as sickly as those of the laboring classes. The highest percentage of laziness and of unruliness was found among boys designated as dull. Boys showed a higher laziness average than girls. The sons of laborers were found less unruly than those of non-laboring classes. The reverse was the rule with girls. Convulsions were frequent in dull boys and those of non-laboring classes, but very rare in girls generally. That nervousness increases with the refinements of life is indicated by the highest average for this defect in the white children of non-laboring classes and the lowest average in colored children.

When blood is restored by thought, exercise or other stimulus to flow from one part of the body to the brain or to another part Dr. MacDonald measures the extent of flow by submerging the part in question—as an arm, for instance—through an airtight rubber dam into a glass vessel of water. As the blood decreases the amount of air between the water and the rubber increases and the increase is measured by a pointer. Quite as sensitive are a score of instruments for measuring movements of muscles. One can be clasped above any muscle of the body for this purpose.

Another records the breathing, and with it it has been learned that concentration of mind causes respiration to grow less and a consequent impoverishment of the blood. Still another records the exact movements of the fingers and toes. Another measures and counts nervous tremblings and still another the sensitiveness to fatigue. Others gauge the pressure and movements of the tongue in speech or nervousness. A still more delicate device registers the exact motions of the lips in talking.

The actions of the larynx—Adam's apple—are similarly studied. To study the wigglings of the soft palate in speech, a button glued to that organ is attached to a lever connecting with a recorder. All such motions are correctly reproduced in white lines upon black paper by a kymographion, acting as an automatic reporter for each piece of apparatus.



THE KYMOGRAPHION.

HOW EXPERIMENTS ARE MADE.

NEW ENGLAND ART.

Bad Moral Effect of Bad Art in the Villages.

There is not one good picture in our whole village—no, not one, says Rollin Lynde Hartt in the May Atlantic. It is not so much that I abhor the tawdry crayon portraits, the cheap lithographs of Alderney heifers and the flamboyant calendars. It is the pretentious substitution for real art that stirs my indignation. Our people become rapturously effervescent over the Bodenhausen Madonna reproduced on glass with a rococo edging of flimsy gilt, and a prop to stand up by. Jim Asa, viewing that wonder exclaims, "Ain't she slick?" And what of the long and narrow etchings by the indefatigable Field? We cross ourselves before them with pious devotion. Yes, and the photographic mavens on hire put upon the bourgeois market—groups of white-draped figures holding lyres or trumpets or other pseudo-Hellenic symbols—these, to elicit our admiration. But chiefest is that shoddy Madonna. M. Charles Blanc says that the test of artistic appreciation is to behold Raphael's Stanze; if you weep, there is hope for you; if you don't, why, eat, drink and be merry—tomorrow you die. Clearly, then, M. Charles Blanc had never seen the Bodenhausen Madonna reproduced on glass, with a peep to stand up by. That, thinks Sweet Auburn, is the ultimate criterion of taste. Moreover, we are musical after our uncouth fashion. There is an instrument of one kind or another in nearly every house. Indeed, I never saw a community where so many people could sing by note, or where so many people could play. However, you will never hear it said in the hills that music has charms to sooth the savage breast; our music never soothes. It inebriates, but does not cheer. Still, having heard no better, we like it. Isolation is not good for music. See what happened in China! "What you you think of aour choir?" asked Hezekiah. 'Wa'n't that solo a booster?" "Well," I replied, "Uncle Dwight hasn't what one would call a cultivated voice." "Dunno 'baout that," retorted the enthusiastic Hezekiah. "Saounds as if he'd been over it at least once with a harrow!" And so it does. So, in truth, do the others. Nevertheless, our vocalists set forth upon heaven-scaling anthems with unexampled audacity.

APPENDICITIS

And the Useless Vermiform Appendix from Which It Comes.

A great deal is heard nowadays about appendicitis. There is no doubt that very many persons are badly scared about it, and the number of persons who will not eat fruit containing seeds is very large—this notwithstanding the fact that medical opinion has agreed that not more than 6 per cent of the cases of appendicitis are due to the swallowing of seeds. The contents of the appendix usually consist of mucus. The appendix has abundant muscular ability to empty itself, and it has at its point of connection with the intestine a good fixed point for muscular action. But a very little swelling will so contract the tube as to prevent the escape of the concretions. It is the bacteria that do the business. They attack the affected appendix, the inflammation extends thence to the adjacent organs. Although now apparently useless, it is believed that the appendix once formed an important part of the alimentary tract. This was in the days when we needed a wisdom tooth for crushing palms and ferns and a large absorbing surface with which to extract their scanty nutriment. The wisdom tooth, with its insufficient calcification, perishes easily when attacked by bacteria, and the appendix shows the same want of resisting power. The vermiform appendix was recognized in the sixteenth century. As compared with the size of the intestine it is largest at birth and smallest after 70 years of age. It is of variable dimensions for the reason that it is one of the structures which, in the descent of man, "flutters before going out." Its average length in a young adult is no far from three and a quarter inches.

"Eaten a Mountain."

A good example of the caustic humor of a Scotch examiner floats this way from we know not where. It seems that Scotch parish schoolmasters are, on their appointment, examined as to their literary qualifications. One of the fraternity being called by his examiner to translate Horace's ode beginning "Exegi monumentum aere perennius," began as follows: "Exegi monumentum." (I have eaten a mountain.) "Ah," said one of the examiners, "ye needna proceed any further; for after eaten' sic a dinner, this parish wud be a puir mouthfu' t' ye. Ye maun try some wider sphere."—Poet Lore.

SAID BY A RAILROAD MAN.

George H. Daniels, general passenger agent of New York Central and Hudson River Railroad, recently delivered an address before the New York Press Association. Among other notable things, he said:

Four years ago I predicted that active efforts toward the extension of American commerce by commercial bodies, supported by a liberal and broad-minded policy on the part of our government, would undoubtedly secure to the United States the blessings that come from a great and varied commerce, and I said that the New York Press Association, and similar associations all over the country, could stimulate a public spirit that would insure the important results outlined.

At that time we had no idea that a war between one of the old nations of the earth and our young republic would be fought; at that time we had no idea that American manufacturers would be furnishing locomotives to the English railroads, as well as Japanese, and no one thought four years ago that American bridge builders would go into the open market and successfully compete for the building of a great steel bridge in Egypt; nor that in so brief a time American engineers would be building railroads into the interior of China from the most important seaports and furnishing locomotives by the score to nearly every country on the globe. In a letter from a friend in Tokio, Japan, written only a short time ago there was this significant sentence: "You will be interested in knowing that I have hanging on the wall of my office a framed picture of your 'Empire State Express,' and we expect in the near future to be hauling a Japanese 'Empire Express,' with an American locomotive." They have now in Japan nearly 100 locomotives that were built in the United States. In Russia they have over 400 of our locomotives, and nearly every railroad in Great Britain has ordered locomotives from this country since the beginning of the war with Spain.

In this connection it will be interesting to note in passing that the second American locomotive was built at the West Point Foundry, near Cold Spring, on the Hudson river, and was called the "Best Friend," and from that day to this the locomotive has been one of the best friends of all our people. But it is not alone our locomotives that have attracted the attention of foreigners who have visited our shores, our railway equipment generally has commanded admiration and is now receiving the highest compliment, namely, imitation by many of our sister nations. Prince Michel Hilkoff, Imperial Minister of Railways of Russia, has, since his visit to the United States a few years ago, constructed a train on much the same lines as the New York Central's Lake Shore Limited. Only a short time ago, at the request of one of the Imperial Commissions of Germany, the New York Central sent to Berlin photographs of the interior and exterior of our finest cars and other data in relation to the operation of American railways. Several other countries have asked for similar information and there is a general waking up of foreign nations on the subject of transportation, brought about mainly by the wonderful achievments of American railways.

The admiration of foreign nations for us is not by any means confined to railways. One incident that startled the entire world, and riveted the attention of thinking people everywhere to American achievments in machinery, was that of the United States battleship "Oregon," built at the Union Iron Works in San Francisco, and which steamed a distance of more than half round the globe, without loosening a bolt or starting a rivet, and arrived at her post off the island of Cuba prepared to perform any service required of her; and then having given a most satisfactory account of herself on that memorable 3d of July, 1898, off Santiago, she steamed back to the Pacific, and without unnecessary delay crossed that great ocean to join Admiral Dewey's fleet at Manila. On her arrival there the Secretary of the Navy received one of those condensed messages, for which the admiral—who has shed undying luster upon the name of the American navy—is so noted, which read as follows: "Manila, March 18, 1899.—The Oregon and Iris arrived here today. The Oregon is in fit condition for any duty. Dewey."

These demonstrations of what American shipbuilders can accomplish, created a desire on the part of every naval power in the world for ships of the character of the Oregon, and the logical conclusion of thinking people was that if we could build ships like the Oregon, anything else that we built must be of a superior quality, and the demand for American manufactures began to increase and is increasing with each day, until hundreds of our factories are now running night and day, and business in the United States was never in a more prosperous condition than it is on the 21st day of June, 1898.

It has been said by a great American writer that "trade follows the flag." Our war with Spain has placed our flag upon the Islands of the Pacific, directly in the natural track between the Pacific coast of the United States and Japan and China, and as we contemplate our growing commerce with these old nations we are reminded of the prophetic statement made at the completion of the first continuous line of railroad between the Atlantic and Pacific oceans, by the joining of the Union and Central Pacific railroads, more than thirty years ago, by that prophet of his time, Thomas H. Benton, who, standing on the summit of the Rocky Mountains and pointing toward the Pacific ocean, said: "There is the East; there is India." Mr. President, since the meeting at Lake George, four years ago, the fortunes of war have placed the United States in the front rank among the powers of the world, and we can no more shirk the responsibility which these events have brought on us as a nation, than we can shirk our responsibility as private citizens.

There are some who seem to think that we might get along without trade with China, and that it is a new fangled notion that Chinese trade can especially benefit the United States.

Commerce with China is much older than many suppose, for it began 115 years ago, the first vessel sailing from New York on Washington's birthday, in the year 1774. This vessel returned to New York May 11, 1775. The success of the venture was such as to warrant its repetition, and from that day to this, trade between the United States and China has continued without material interruption, until it is now greater in importance and value than that of any other nation trading with China, with the single exception of Great Britain. If we are to continue as one of the great nations of the world, we can hardly afford to ignore a country that comprises one-twelfth of the land area and nearly one-fourth of the population of the globe.

The influence of the press, particularly in this country, is immense, and it is growing year by year, and with reasonable co-operation and reciprocity between the press, the transportation companies and the commercial and industrial interests of the country, there can be no doubt about our supremacy.

At times there have been periods of legislation adverse to the great transportation interests of the country, almost invariably the result of a misunderstanding of the real situation, and the hasty legislation of such times has usually been repealed upon the sober second thought of the people, for in the language of our great Lincoln: "You can fool all the people some of the time, some of the people all the time, but you can't fool all the people all the time." There are still some people who fear that consolidations, especially of transportation companies, will result disastrously to the general interests of the country. There is one example to which I wish to call your attention, and which, I think, each of you will appreciate. Forty-seven years ago, there was issued an annual pass over the Central Line of Railroads, between Buffalo and Boston, and by the People's Line of Steamboats to New York; this pass bearing the following signatures on the back thereof: Ezekiel C. McIntosh, President, Albany and Schenectady R. R. Co.; Erastus Corning, President, Utica and Schenectady R. R. Co.; John Wilkinson, President, Syracuse and Utica R. R. Co.; Henry B. Gibson, President, Rochester and Syracuse R. R. Co.; Joseph Field, President, Buffalo and Rochester R. R. Co.; William H. Swift, President, Western R. R. Co.; Isaac Newton, People's Line Steamboats; Job Collamer, Watertown & Rome R. R. Co.

Mr. E. D. Worcester, Secretary of the New York Central, says he rode on a ticket of this kind from Albany to Boston in the summer of 1852, and he remembers distinctly the signature of each of these Presidents. What would you think if in preparing to attend your annual meeting you had to write to eight different persons to secure transportation from New York to Niagara Falls? I am sure you appreciate the fact that it does not require eight letters to secure such transportation, nor does it require seven changes of cars to make the journey as it did in 1852.

Few Know It.

Ella Wheeler Wilcox is a recognized authority on the subject of love. Speaking of it she says: "Very few people really love. I dare say not one-third of the human family ever experienced the passion in its height, depth, length and breadth. Scores, yes, hundreds of people go to their graves believing that they have known love, when they have only encountered its pale shadow—a warm friendship, or a tender affection, or a good comradeship."

She Dared.

"Your teacher whipped you?" roared Gayboy. "How dared she?" "Well," blubbered the boy, "she said she also licked you when you were in her class, and she guessed she'd risk it."

Continuous.

Mrs. Sentimental (watching her sleeping child)—How true it is that "heaven lies about us in our infancy!"

Her Cold-Blooded Husband—Yes, and somebody else keeps it up afterward.