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# BERIAN CHARACTERS IN WEST-IRELAND

(INCL. CONNAUGHT)

*Communication presented at the XIV Congress of Medicine  
in Madrid, April, 1903.*

BY

**MR. RICHARD JOHN ANDERSON**

(GALWAY)



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## IBERIAN CHARACTERS IN WEST-IRELAND (INCL. CONNAUGHT)

par Mr. RICHARD JOHN ANDERSON (Galway)

The correspondence of hair colour to racial character has been so much recognized that no apology is necessary for approaching in a similar way the question of the proportion of brown to light races in Ireland.

The estimate of the percentage of Hair and Eyes given in the table in Krauses Anatomy shows in Lauenburg, Ostfriesland, Schleswig Holstein, Oldenburg, Pommern, and Hanover over 40 per cent. blondes, and 6 to 8 per cent. brown, whilst in Bavaria, Alsace-Lorraine 18.4 per cent. and Bavaria 20.4 p. c or in North Germany 25.0-33 O. p.c. South Germany 18.4-27 p.c. These represent the number of blond hair, blue eyes, and white skins, compared with the percentage of brown eyes, dark hair and brown skins.

The remaining percentage falls into mixed forms, grey eyes, of which there are 32.9 per cent. in Wurtemberg.

The blondes are chiefly Dolicho-cephalic, and the brown are brachycephalic, the blondes with grey eyes are mesocephalic.

These facts show that the race is a mixed race, and two or more races formed the ground race of the German people.

The German Dolichocephalic were generally blue eyed, tall, strong, and white.

The Paragermanic Brachycephalic are blue-eyed, brown haired, small, weaker (comp.) and dark skinned.

It is now pretty well established that all European nations are mixed. There does seem in various places a trace of the original Celtic Type. Linguists naturally attach importance to language and find that highlands of Scotland and Ireland contain those who belong to the Celtic race and speak the Celtic language; then the Cymric races who speak a variety of Celtic include the Welsh, the Cornish, and the Bretons.

Alexander Macalister summerizes simply the race succession in the West of Europe, and his summary is here added.

(1) The oldest traces hitherto found have been of a dolichocephalic. robust, small, race with platycephalic heads and very small chins and large orbits.

(2) In Western Europe these were followed by a second taller dolichocephalic race, with large skulls, distinct chins, wide cheek bones bowed ulnae, grooved fibulae, and platynemic tibiae.

(3) A third distinct and ladeleter prehistoric race of brachycephali had short heads, and a low stature.

The Neolithic men consisted of two chief groups, one (a) the older melanochoic, possibly ancestral to the black Celts, another (b) Xanthochoic, possibly Cimbric in origin.

The remains of the former are found in the long barrows; and of the latter in the round barrows. The latter are probably bronze men.

Traditions, mostly mythological, have got mixed up in Irish Historical Geography.

(A) The first race seems mythical, a race of distorted giants with single eyes. Some say these were African pirates.

(B) The Parthalonian Race contemporary with a mythic Greek race. These with the giants lived but died out.—

(C) The third race were the Nemedians, and came from the great plain (a mythological place) they appear to have been men of moderate size.

Those of this race, who were not killed escaped to England and the continent of Europe.

Mythology says that a portion went to (A) Greece, (B) a portion to Russia and Poland (C) and a third section to Norway.

(1) The Grecian section (the Firbolgs) returned from Greece to Ireland and remained at peace for a time.

(2) The Norway section came back and were called Dedanaans who drove the Grecians to Connaught and the Islands, they beat the giants near *Cong* in Galway.

The Scythian Section were Gaels and came to Ireland and conquered the Dedanaans who were driven into the Hills, these became fairies (mythological), some ordinary sized and some of pigmy size. The conquering race was the true Milesian Race.

The traditions of Brittany point to a dwarf race and a large sized race, which seem to have corresponded chronologically to the pigmy and larger fairy races of the Dedanaans. There is perhaps, only a «perhaps» in all this, but the tradition is interesting. The tales of giants coincide with the Northern tradition of the giants, and the Southern stories of the Titans.

Attention was paid to the race and education of the British Isles many years ago and the comparison of the statistics with those already given proof interesting.

Light Blue, Blue, Dark blue or grey eyes with Very Fair.

Brown Hazel, Or Black eyes with.

Light Brown or Brown Hair Argyll 42 Bute.	Black or Brown Hair and Arran.	Golden or Red Hair.	Brown Black Hair.	Fair Hair.	Red or Red Hair	Light eyes.	Dark eyes.
142 . 9	22 . 1	5 . 7	24 . 3	0 . 7	2 . 1	70 . 8	27 . 1
North Hamptonshire 40 . 7	20 . 7	2 . 6	24 . 35	3 . 3		64 . 0	31 . 6
Gloustershire. 50 . 3 (Bristol Included)	14 . 3	2 . 2	30 . 2	1 . 4		66 . 8	31 . 6
Ulster 49 . 4	24 . 7		22 . 2	1 . 2		74 . 1	23
Ireland Connaught. 59 . 0	24 . 1	1 . 2	13 . 3		1 . 2	84 . 3	4 . 5

It would thus seem that dark hair is commoner in Ulster than in Connaught. and Lieinster has the largest proportion of dark eyes.

Taking Connaught, Dele, Dr. Chas. R. Browne has done much to set us right in the matter of Anthropological characters of the inhabitants of the Province of Connaught. These were in one district 11 black haired men in 182, and, 8 black haired women in 127 and one of the former and three of the latter had dark eyes; so that black haired women had oftener black eyes than black haired men. There were, however, 51 dark haired men and 33 dark haired women, 8 men and 11 women had dark eyes.

There were 98 brown haired men and 69 brown haired women, 88 of the former had light eyes, and 60 of the brown haired women had light eyes.

Thus the great majority of men and women are light eyed viz. 77 out of 127. Red hair is rare.

Now in view of the recently published investigations of Cossar Ewart it will appear that variations may arise with varying conditions of food and race admixture.

Some of these conditions which *Ewart* lays so much stress upon have always occurred in varying proportions at different times in Ireland.

There were very few black haired children 1 . 92 per cent. males, and 2 . 38 per cent. girls. There were 2 dark eyed boys and 2 girls.

Then 82 boys out of 104 had brown or light hair, 22 had dark or black hair but only 9 out of 104 were dark.

58 girls out of 84 had light eyes and 51 of these had brown or light hair.

Index of Nigrescence in Adult Males	28 . 03
Females	25 . 11
Boys	7 . 68
Girls	8 . 32

In the Islands of Lettermullen and Garumna. Browne found the index of Nigrescence 16 . 66 amongst the Males 33 . 85 in Females.

In boys 5 . 68 and in Girls 6 . 25. 39 out of 186 men were dark or black haired with *light eyes*, and 126 were light eyed with brown, fair, or red hair, there were 138 light eyed women out of 195 and 88 of these had brown hair, 12 light and 5 red, whilst 53 were dark or dark haired, 6 black haired men and 5 black haired women had dark eyes.

68 out of 88 boys had light eyes, of these 39 had brown, 15 fair. 4 red hair, 10 only had dark hair.

The girls showed 62 out of 80 with light eyes and of these 34 had brown hair, 16 fair and four red.

18 had dark hair and of these 5 had dark eyes.

In Ballycroey Co. Mayo. The index of Nigrescence was

	51 . 67 amongst men.
and	63 . 75 amongst women.
Boys	42 . 76
Girls	54 . 54

Here 119 men had light eyes out of 151, of these 56 had dark or black hair and 63 had brown or fair hair. There were eight with dark eyes. Amongst Females.

62 had light eyes out of 80, of these 33 had dark or black hair and 29 brown, Fair or Red whilst 7 had dark or black eyes.

Amongst Boys 31 had light eyes out of 35, and of these 14 were dark or black.

Amongst girls 16 were light eyed out of 22 and 8 out of the 16 had dark hair, only three had dark eyes.

It would seem that the race as represented by the inhabitants of Connaught is mixed. Iberian characters are still quite apparent in certain districts, but the lighter blonde characters are conspicuous. Black hair with light or medium eyes which are regarded as Basque characters are also to be noted. This seems to be of importance in summing up all the evidence that point to relationships of Ireland with the North of Spain.

Spanish Merchants and clergymen visited Ireland not unfrequently at an early period of Irish history and Irish Itinerants visited Spain on tours of educational observation. The shape of the churches and the build of the old houses of Galway seem to support this evidence, and the bells and their mode of use seem also to point Early Iberian influences. There are also some names to be found in the old records that form shadowy links between Connaught and Iberia.

The city of Galway is regarded as the place that has yielded least

to encroachments of the more modern upon its early Iberian culture and some houses still exist to attest the Historic value of the records.

A place of considerable Historic importance in Galway is the Claddagh which for a long time refused to submit to Norman influences. The life of the people is primitive and so I venture to enquire whether the hair and eye colours are suggestive of a less admixture of race than elsewhere in Connaught. It may be said, however, that some observations on the Naval Reserve men here, although too few to be of much value, (these men come from the County of Galway or adjacent Counties) showed some evidence that their origin was from two or more racial streams.

It is clear that the brunette characters may have been latent in some during one or more generation and may have been evoked by some change of food or habit or alteration in health or environment.

The Claddagh School children presented some very interesting features. The numbers of dark eyes or dark hair were not great, but some varieties were noted. Blue eyes and brown hair are commonest, but black hair was rare. Hazel eyes and light brown eyes are also to be noted.

*School Children-Boys.*

Hair Colour.	Eyes dark or Brown.	Blue.
Brown.....	36	10
Black Brown.....	21	7
Red or Yellow.....	6	3
Fair.....	38	28

	Girls.	Eyes Brown	Eyes Blue.
Brown.....	11	8	26
Dark Brown.....	40	3	8
Fair.....	13	1	12
Red or sandy.....	5	2	2

*Naval reserve per centage.*

	Hair pc.	Brown Eyes pc.	Blue.
Black.....	9	6	3
Br. Black.....	23	9	11
Fair.....	32	8	23
Red or Yellow.....	12	3	9
Brown.....	14	0	14



The Colour of the eyes known as grey is not summerized. The brown eyed people are distinguished from the blue eyed.

*Claddagh Piscatory School, Male.*

	NAME	AGE	HAIR	EYES
1	Foley Martin.....	8 1/2	Light brown.	Sky blue.
2	Roan Patrick.....	12	Brown.	Grey.
3	Ridge Thomas.....	14	Brown.	Grey.
4	O'Halloran Joseph.....	11	Brown black	Brown.
5	Baskin Thomas.....	12	Brown.	Brown.
6	O'Conner John.....	10	Brown.	Brown.
7	Faherty Martin.....	12	Brown.	Blue.
8	O'Donnell John.....	7	Brown.	Light Blue.
9	Flanigan 'Martin.....	8	Brown.	Blue.
10	O'Halloran Patrick.....	13	Brown.	Brown.
11	Gannon Joseph.....	15	Brown.	Dark Grey.
12	Keenan Henry.....	13	Brown.	Grey.
13	Quoye Francis.....	11	Brown black	Blue.
14	Herman Martin.....	13	Light (Sandy)	Brown Grey.
15	Griffen Michael.....	12	Brown.	Dark Grey.
16	Cook Jack.....	11	Fair.	Dark Blue.
17	Curran Martin.....	13	Fair.	Dark Blue.
18	Morris Thomas.....	13	Fair.	Dark.
19	Gannon Michael.....	15 1/2	Sandy.	Blue.
20	Mc Namara J. J.....	14	Brown.	Grey.
21	Gannon James.....	13	Fair.	Dark Blue.
22	O'Halloran James.....	13	Brown.	Brown.
23	Carty Ernest.....	15	Black.	Brown.
24	Connaughton John.....	13	Black brown	Blue.
25	Cunningham Martln.....	13	Brown.	Blue.
26	Kelly Joseph.....	13	Brown.	Blue.
27	Clancy Michael.....	11	Fair.	Grey.
28	Kearney John.....	10	Brown.	Brown Grey.
29	Farrell Martin.....	10	Fair brown.	Dark Brown.
30	Cloherty Tomas.....	11	Dark.	Brown Grey.
31	Donnelly Peter.....	12	Black.	Grey.
32	Burke Patrick.....	11	Borwn.	Blue.
33	Ridge Michael.....	10	Fair.	Blue.
34	Fahy Michael.....	11	Brown.	Light Blue.
35	Kevins Michael.....	11	Black.	Grey.
36	Dougan Rodger.....	13	Dark black.	Dark Blue.

	NAME	AGE	HAIR	EYES
37	Cloherty Patrick.....	10	Fair.	Blue.
38	Burke John.....	13	Black.	Brown.
39	Conneely Martin.....	10	Brown.	Brown.
40	Foley Patrick.....	12	Yelow.	Grey.
41	Connor Michael.....	11	Brown.	Blue.

*Claddagh Priscatory School, Male.*

42	Conneely John.....	11	Brown.	Grey.
43	O'Conner Michael.....	12	Brown.	Blue.
44	Tobin Thomas.....	11	Brown black.	Brown grey.
45	Joyce Stephen.....	11	Fair.	Blue.
46	Burke William.....	10	Brown.	Brown.
47	Conneely Patrick.....	10	Brown.	Hazel.
48	Noon Michael J.....	10	Brown.	Hazel.
49	O'Brien Stephen.....	11	Brown.	Brown grey.
50	Flaherty John.....	12	Brown.	Grey.
51	Mc. Namara Patrick.....	11	Brown.	Grey.
52	Tierney Denis.....	8	Fair.	Light blue.
53	Tracey Martin.....	10	Brown.	Light blue.
54	Hyland Michael.....	9	Fair.	Light blue.
55	Bodkin John.....	8	Fair.	Light blue.
56	Curran Stephen.....	9	Fair.	Light blue.
57	Folan Stephen.....	10	Fair.	Dark brown.
58	Griffin Martin.....	10	Very fair.	Blue.
59	Hynes John.....	9	Fair.	Blue.
60	Lynch Forman.....	9	Reddish.	Light blue.
61	Conneely Patrick.....	12	Brown.	Light blue.
62	Glynn Patrick.....	6	Fair.	Light blue.
63	O'Donnell William.....	3	Fair.	Light blue.
64	Faherty Dominick.....	10	Fair brown.	Dark blue.
65	Kane Richard.....	6	Fair.	Dark blue.
66	O'Donnell Patrick.....	8	Dark.	Brown.
67	O'Donnell John.....	7	Dark brown.	Grey brown.
68	Hynes Bartley.....	7	Brown.	Brown grey.
69	Kane Thomas.....	7	Fair.	Dark grey.
70	Kane John.....	5	Dark brown.	Dark grey.
71	Flaherty Dominick.....	6	Fair.	Light blue.
72	Burke Dominick.....	9	Dark.	Dark blue.
73	Mc Donagh p.....	12	Black.	Dark.
74	O'Donnell p.....	10	Fair.	Blue.

	NAME	AGE	HAIR	EYES
75	Folan M.....	9	Fair.	Dark blue.
76	Curran P.....	11	Fair.	Dark blue.
77	Kelly M.....	8	Brown black.	Light blue.
78	Donaghue Martin.....	9	Black.	Hazel.
79	Huorney Patrick.....	10	Brown.	Light Grey.
80	Còllins John.....	10	Fair.	Light blue.
81	Hart Patrick.....	8	Fair.	Light blue.
82	Mc Namara John.....	9	Fair.	Dark blue.

*Claddagg Piscatory School, Male.*

83	O'Donnell Martin.....	11	Dark.	Brown.
84	Joyce Folan.....	10	Fair.	Light Blue.
85	O'Donnell Mar.....	5	Fair.	Grey.
86	O'Donnell Dominick.....	9	Dark brown.	Brown Grey.
87	Mc. Key Joseph.....	5	Red.	Brown.
88	Flaherty Bartley.....	10	Fair.	Light Grey.
89	Gannon Martin.....	9	Fair.	Brown.
90	Cloherty Michael.....	9	Brown Black	Light blue.
91	Curran Joseph.....	9	Fair.	Dark blue.
92	Carty Walter.....	9	Dark brown.	Brown.
93	Madden Thomas.....	9	Light Sandy.	Light blue.
94	Flaherty Joseph.....	9	Fair.	Brown.
95	Kelly James.....	9	Fair.	Light blue.
96	Tierney John.....	10	Brown.	Light blue.
97	Tracey Laurence.....	9	Brown.	Grey brown.
98	Hurney Joseph.....	6	Brown black	Light blue.
99	Folan Patrick.....	7	Brown.	Brown Grey.
100	Kelly Michael.....	7	Fair.	Light blue.
101	Flaherty Thomas.....	4	Fair.	Light blue.
102	Kelly Patrick.....	4	Light brown.	Light blue.
103	Hynes James.....	4	Brown.	Brown.
104	Collins Thomas.....	6	Brown.	Light blue.

*Claddagh Piscatory School. Female and infant.*

	NAME	AGE	Colour of Hair.	Colour of eyes.
1	Mari Pallington.....	9	Fair.	Blue.
2	Mary Clancy.....	7	Brown.	Blue.
3	Delia Duggan.....	9	Dark Brown.	Blue.
4	Mary Wallace.....	8	Brown.	Grey.

	NAME	AGE	Colour of Hair.	Colour of eye.
5	Nora Conner . . . . .	7	Dark Brown.	Blue.
6	Cristy Kelly . . . . .	7 1/2	Brown.	Blue.
7	Maria Burns . . . . .	13	D. Brown.	Blue.
8	Mary Naughton . . . . .	6 1/2	D. Brown.	Brown.
9	John Burke . . . . .	8	D. Brown.	Blue.
10	Annie Harte . . . . .	13	Brown.	Brown.
11	Marian O'Donnell . . . . .	13	Brown.	Blue.
12	Marian Toole . . . . .	12	Brown.	Blue.
13	Annie Donohue . . . . .	12	D. Brown.	D. Brown.
14	Mollie Delargy . . . . .	13	D. Brown.	Blue.
15	Mary Kate Neill . . . . .	10	Fair Brown.	Blue.
16	Nora Flaherty . . . . .	11	D. Brown.	Blue.
17	Emily Pallington . . . . .	7	Fair.	Blue.
18	Lizzie Kearns . . . . .	8	Very Dark.	Dark Brown,
19	Maggie Folan . . . . .	7	Dark.	Grey.
20	Bridget Langly . . . . .	10	D. Brown.	Brown.
21	Annie Delargy . . . . .	8	Dark.	Grey Blue.
22	Martin Roche . . . . .	8	Dark.	Blue.
23	Duggan Patrick . . . . .	6	Fair Brown.	Blue.
24	Curran Peter John . . . . .	6	Fair Brown.	Blue.
25	Kellu John joe . . . . .	7	Dark.	Dark Blue.
26	Rabbits Jack . . . . .	6	Dark.	Blue.
27	Clancy Bridget . . . . .	7	Brown.	Brown.
28	Kearns Bernard . . . . .		Dark .	Blue.
29	Geary Michael . . . . .		Dark.	Blue.
30	Oliver Magie . . . . .		Dark.	Blue.
31	Cnrran Pat . . . . .		Dark.	Blue.
32	Bridget Gurrán . . . . .		Dark.	Blue.
33	Rabbit Kathleen . . . . .		Dark.	Blue.
34	Flagerty Bridget . . . . .		Dark.	Blue.
35	Toole Bridget . . . . .		Dark .	Blue.
36	Flaherty Maggie . . . . .		Dark.	Blue.
37	Hurney Joe . . . . .		Dark.	Dark.
38	Dwyer Anthony . . . . .		Dark.	Dark Blue.
39	Mc Nally Mary Anne . . . . .		Brown.	Blue.
40	O'Brien John . . . . .		Dark.	Blue.

*Claddagh Piscatory School Female and infant.*

	AGE	HAIR	EYES
41	Curran Mary Ellen.....	Dark.	Blue.
42	Barrett Mary.....	Sandy.	Blue.
43	O'Flynn Michoel.....	Reddish.	Brown.
44	Connol Bridget.....	Fair brown.	Blue.
45	Duggan Michael.....	Dark.	Blue.
46	McHugh Katie.....	Brown.	Blue.
47	Belton Minnie.....	Very Fair.	Blue.
48	Mannion Minnie.....	Dark.	Dark Blue.
49	Geary Sarah.....	Fair.	Blue.
50	Geary Maggie.....	Brown.	Blue.
51	Flynn Mary Anne.....	Fair Brown.	Brown.
52	Naughton Delia.....	Dark.	Blue.
53	Donaghue Kitty.....	Very Dark.	Dark Brown.
54	Moore Nelly.....	Fair.	Blue.
55	O'Donnell Mark.....	Dark.	Grey Blue.
56	Harte Martin.....	Dark.	Hazel.
57	Flaherty Laurence.....	Brown.	Blue.
58	Ryan Tom.....	Whitish.	Pinkish Blue
59	Concanonn Owen.....	Fair Brown.	Blue.
60	Folan Tim.....	Dark.	Dark.
61	Kelly Raymond.....	Fair.	Blue.
62	O'Brien Thomas.....	Dark.	Dark.
63	Rush Stephen.....	Dark.	Blue.
64	Wallace John.....	Fair Brown.	Blue.
65	Connolly Tom.....	Brown.	Dark Brown
66	Flaherty Dominick.....	Fair.	Blue.
67	McKay Joseph.....	Red.	Reddish Brown.

*Naval Reserve Men - Renmore.*

*Colour of eyes Colour of Hair.*

1	Grimes John.....	Grey.	Black.	Limerick.
2	Hayes John.....	Hazel.	Dark Brown.	Limerick.
3	Allen John.....	Blue.	Sandy.	Limerick.
4	Kean John.....	Blue.	Ligt Brown.	Clare.
5	Walsh Michael.....	Blue.	Brown Black.	Spiddal.
6	Hession Thomas...	Blue.	Brown.	Galway City.

	B	HAIR	
7	McDonagh Walter..	Light Blue.	Barna.
8	Foran Michael.....	Hazel.	Clare coast.
9	Garry Michael.....	Blue.	Clare.
10	Deleary Thomas...	Blue.	Clare (Suoth).
11	Griffen John.....	Blue grey.	Arran.
12	Folan Patrick.....	Blue.	N. Arran.
13	Kinneely John.....	Blue grey.	Spiddal.
14	Kinneely Thomas...	Hazel.	Barna.
15	Braddon Thomas...	Hazel.	Reddish Brown. Limerick.
16	Finnall Thomas....	Blue.	Light Brown. Clare.
17	McDonagh Thomas.	Blue.	Brown black. Galway city.
18	Burke Michael.....	Light Blue.	Brown. Galway.
19	Conneely Stephen..	Hazel.	Black. Galway.
20	Mcarty J.....	Grey.	Brown. Clare.
21	Gould John.....	Blue.	Light red.
22	Hardy John.....	Dark grey.	Brown.
23	Lucy S.....	Grey.	Brown.
24	Sullivan Patrick...	Hazel.	Fair. Clare.
25	Doyle Martin.....	Hazel.	Brown black. Clare.
26	Donaghoe Thomas..	Blue Light.	Light brown. Costello Bay.
27	Forde Thomas.....	Hazel.	Brown black. Roundstone.
28	Holahan J... ..	Blue.	Brown. Clare.
29	Grattan J.....	Blue Grey.	Brown black. Arran.
30	Milligan Ptk.....	Blue.	Light brown. Clare.
31	Cloherty Ptk.....	Blue.	Reddish. Boffin.
32	Kendrick J.....	Blue Grey.	Black. Limerick.
33	King John.....	Grey.	Fair. Galway city.
34	Ryan John.....	Blue.	Fair.

Brown = el moreno.  
 Blue = el azul.  
 Grey = el pardo.  
 Dark = obscura.

Yellow = amarillo.  
 Red = el encarnado.  
 Black = el negro.

### «MUSCLE FORMING UR MOOLDING»

par Mr. RICARD JOHN ANDERSON (Galway).

The Training of muscles to do special work is so much aided by organs of special sense that it is not surprizing that the actual value of muscle sense has been under estimated by some and over estimated by others. We do know that various terminal organs come to usurp the

place of a decadent organ of special sense, e. g., in deep sea and blind fishes, and hence the muscle sense may be often in abeyance. It will be allowed also that animals do not limit themselves to any special group or groups of muscles in moving. The muscles of the head and tail, those of the subcutaneous tissues and ribs, all are pressed into service, and so the phenomenon of movement must be accomplished at any cost, but the principle of least force is illustrated throughout, and Samuel Houghton showed that in the use of muscle force nature is always very «conservative».

The mode used by Mathematicians to delineate forces in relation to magnitude and direction, shows a different appreciation of the value of lines to that of the Geometrician, and the Geometricians will pardon me when I say that we have been misled in our conceptions of space and time by the elaborate deductions which the Geometer places before us, based on experience primarily, but an experience which Professor Mach shows to be the result of complicated nervous operations.

The term space for the Metaphysicians seems to approach more closely the opinions or views of Physiologists, for one can have no conception of the infinite. In order to appreciate the value of space so called, one must come to the concrete notion.

Now, if we take a line we learn primarily its nature by going from end to end of it with the point of a pen or a steel point, so we determine primarily a solid just as a dog investigates a stone for the first time. The lapse of time during the movement of a point along a line, or the time occupied by going over and under a body, and from the right of it to the left, the changes in the direction, all these involve the question of time. It may be said that the change in the direction requires space as a primary or principal condition, and so does the tracing of the line. But a moment's consideration will show that our idea of space is built of experience physiologically. The essential feature is fixation, and space, so called, is in its widest sense limitless, but every effort to form a conception involves primarily the question of motion, and therefore of time, but with educated senses, the stimulation of sentient cells come into play.

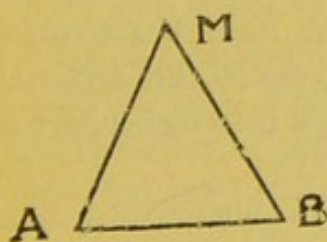
The motion of a pendulum from side to side, is sometimes made to mark a line, in some mathematical investigations. The timing of a swing or vibration, which is done in the case of metronomes, by adjusting the weight and pendulums may have the length of a line made by a pendulum point substituted for it, and thus a line varying with the length of the pendulum, may be a gauge of the time. Lines are

actually used to measure velocities relatively, or to represent velocities as they are used to indicate the direction and magnitude of forces.

If a modification of the pendulum be used so as to have a combination of two forces, a curve may be generated; and here time is equally in evidence, although the force behind the movement may be available to record the movement as it increases the tension. Time, however, remains when force, or rather weight, diminishes, for if the first be constant, it is the time that may be made use of.

The earliest attempts to form physiological conceptions seem to have been based upon the contrast of fixation and movement. Rest and motion, the moon and the sun, the earth and the sun, the yin and the yang, give place to the latter resolution of the moving power into the mover and the power. Time was unfortunately left out of some of the most important statements with reference to Hypotheses or acts. It was looked upon perhaps as a constant and troublesome friend that is always going but never goes. Time in the olden times was made for slaves, in our own times it is the most prized of all. Slowness and perfection are not unfrequently combined in the performances of the skilled. It is then most important to have the mathematicians in our favour when we speak of spatial qualities as most naturally and primarily associated with movement or its essence time.

Now our knowledge of spatial quality is gained, of course, in various ways by adults, but by young animals through the motor organs, and it is evident that a muscle will be able to appreciate the difference between the movement from A to B and from A through M to B,



*Fig 1*

even though the construction be of a kind to generate a linear movement only, but the elasticity of the muscles comes to have an important bearing on these changes of direction, especially where the movements are registered. Muscles register time, and in registering time are able to register so-called space.

Registration of time seems to be the important primary object, for even weight itself may vanish with a greater diminution of time.

Raising 1 lb. a foot is the same as raising 2 lb. six inches without regarding gravity. The gradual diminution in the W leads if the force be constant to a decrease in time, but the diminution in the force must lead to diminution in the weight if the time be constant, whilst the distance must keep increasing with time.

In other words we have no elementary or primary knowledge of



space, except through time. The elementary idea of space, or its essence, is fixity, and the elementary notion of time is motion which may be put in this way, namely that

The essence of Time = Motion.

To advocate, therefore, training of men and animals by beginning with muscle training—and this has not only been not avoided, but has gained and does gain some attention, is to advocate beginning the training of an animal by its first tools. Alteration in speed means the introduction of a new element acceleration =  $\frac{1}{2}$  atz, but with a constant speed alteration of direction is registrable. It so happens that the principle of utility is the principle that guides mankind.

Take the training of the horse. The trainer depends on the animal's eyes and ears, and calls upon them to register the operations, which the muscles undertake to do and to accomplish, and the trainer knows that the earliest records are of little value. The truth being that a two years old horse has no experience of the value of objects outside itself until it is trained. A pasture land gives a young horse no notion about street and highways. and the animal will walk into a pit as readily as not. Hence the preliminary training is mainly a muscle training. The best of this training is undoubtedly its muscle moulding. The horse is led on in a continuous fashion in a right line, he is then stopped and stroked, he is then led on continuously for a time, then stopped appreciate the importance of the continuous movement and then again. If the animal be made to move in a ring, first in a forward direction and then in a backward, the result is ultimately the same. The moving and stopping: first the walking succeeded by stopping, then the trotting succeeded by walking or halting, all train the muscles to the different poses, the alternative of movement and rest, brings into relief certain muscles, and soon limb muscles become formed.

The degree to which the horse must lift its limbs in order to step over an obstacle is soon ascertained for objects of a particular size, such as the heights and hollows in a ploughed field, then the lifting once learned may be maintained for a time. Thus it happens that the high stepping may be favoured by simple muscle training. Those who have experience know how very little a horse is indebted to his eye in these matters. In many, if not in most cases, a horse's knowledge of the height of a fence is most rudimentary, at least so far as the eye alone has educated, the horse, but the truth seems to be, that a horse has a knowledge of distance chiefly through the knowledge of time, and his knowledge of time is through his muscles. It is certainly unusual to begin training horses at

two years by putting them between the shafts of a machine and leading and driving them about. I have tried the experiment, and with good results. The animal is, no doubt bothered, at times, by the vehicle following it everywhere; but the animal has little regard to what it sees or hears, and the muscles are the main factors, in perceiving and responding to the perceptions.

Yet, all this seems very natural, for does not all our knowledge of the Protozoa, and many higher animals, point to the muscle as being the most important. In teaching a small dog tricks, at first he is quite unable to coordinate his muscles. I have spent a considerable number of stretches of time in getting a small dog to «sit up.» He does not understand, and his muscles do not understand what they are expected to do, but very soon the muscles learn, and learn before the dog learns how to perform the manoeuvre. The horse will not lift up his leg for a good while after the training to do this is begun, but by carefully bending the knee in response to a touch or sound or sight, the association becomes established; but this is not necessary, one is tempted to say, for one often sees a dog or a horse lift his leg when it is touched or grasped or slightly raised or bent. Indeed the latter will often succeed when the other stimuli fall short. The practice of forcing an animal to assume an unusual position is common enough in training animals that are meant to perform tricks or do circus work. The moulding of the proper muscles by movement of the limbs to and from by the hand or by straps is largely depended on. In this way movements are isolated which are often combined, and are in adult animals almost always combined, so indeed this is probably the chief reason why adult animals do not respond to the trainers' methods so readily as young animals, but the training in the latter passes off more readily perhaps than in the former. It is impossible to answer for dog or horse after a long spell of idleness, but there are special breeds and types that hold training, especially natural training for them, longer. Thus, the pure bred pointer is more likely to hold to his training than the mixed bred setter. The getting out of form in man or animal which sets in after a long period of idleness, means the difficulty in grouping the muscles, and hence the opinion of breeders with reference to a new training every year. It is certain, however that the muscle fixing or moulding should be studied in conjunction with a special observation of the progress of the various senses, the touch, nose, eye and ear and taste. The relative sensitiveness of each sense is different for different animals no doubt. Especially marked is this in some. Note the want of smell in birds as compared with their acuteness of sight and

hearing: note the acuteness of smell in many animals, the acuteness of early impressions depends without doubt on their repetition, and there is little doubt that in the gradual development of the brain, many impressions are apt to become transitory or obliterated like the writing of characters on the sand, the waves of stimuli and readjustments all tend to obliterate the impressions even in an adult brain, where the impress may be very superficial.

Our experience tends to establish the fact, however, that there is something very concrete in the movements of animals.

The muscle strain or muscle contraction is very clearly perceived, the first giving rise to the second. Extreme extension suggests contraction. The period of expiration is succeeded by a period of inspiration.

A muscle when unduly extended or unduly contracted, may be said to be in a state of unstable equilibrium, for the muscle in regard to its physical property, viz., elasticity; and its vital contractibility, is influenced by its elasticity. It is clear that in flexing or extending a joint, both these qualities may contribute their quota in rendering a passive movement appreciable to the animal on which the passive movement is practised, the muscle nerves take cognizance of the various states, and it may with safety be urged that no two positions of a muscle produce the same effect upon the nerve terminals and the finer plexuses. Joints and fascia do not appear to be very sensient, but the skin is, and all may contribute their share in rendering the position of the muscle consciously or unconsciously appreciable. If we select an example, say the elbow joint, the category of muscles acting so as to flex are opposed to those that act so as to extend the joint. The triceps posteriorly, and the Brachialis anticus and biceps and others anteriorly are clearly opposed as far as the elbow joint is concerned. In forced extension the biceps, and in forced flexion, the triceps seem chiefly in requisition, to test the elasticity and to continue to register this, but with our knowledge that muscles are commonly somewhat stretched both on the flexor and extensor side of the limbs, that the continuous flexion means continuous shortening of one muscle and continuous lengthening of the others, that is when both are active alternately: The muscle of action vertebrates are the result of detailed grouping of the strands. One gets a clearer notion of the muscular system by viewing it as a continuous whole, which has been done by

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N. B. See Authour's papers in Newcastle (BA) Reports (1889), and Southport Reports (1883), in Kühnes untersuchungen,

anatomists, the bones come in later phases of development, in some cases, at the places of relative fixity, and fascia and fibrous tissue at others.

The muscle system viewed in this way differs but little from our knowledge of Amoeboid action. The muscular system is, of course, controlled by the nervous system, but it is, probably, all through, susceptible to a stimulus which will evoke a continuous contraction, as has been proved for some muscles long ago without the introduction of terminal organs.

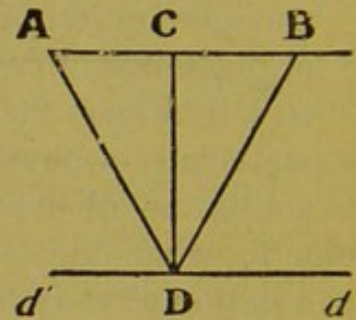
Our perception of space «expresses the mutual biological adaption of large groups of connected elementary organisms» Mach.

It will be seen that the actual concrete idea of a solid body gained geometrically or physiologically does involve on the one hand geometrical and on the other physiological considerations. The three dimensions come in when one is speaking of a house or a room, but obviously the relation of those measurements is fixed for some geometrical figures and limited for objects of art or architecture, and so the metaphysician tells us we must go back to the real or concrete to keep ourselves correct. Our spatial idea is not, therefore, a fixed idea. Geometrically it is in its extreme limits inconceivable, and so the word for some means the infinite unlimited something in which we live, but for others the actual position occupied by a body or object, the mould which surrounds it on all sides is space, the space occupied by the object or body is spoken of also in a limited sense as space or a fraction of space. It is thus enough that space geometrically is different from space physiologically, but the latter has a broader basis than we are inclined to assign to it at first, and the foundation in which the geometer rests his superstructure is susceptible of a very different physiological significance than touch or sight perception. One must admit that Professor Mach (Vienna) has struck at the key note of the interpretation when he says that the muscles of the eye are early concerned in locating an object. It is equally clear that it is the moving object that first attracts, or, at least, attracts best the attention of the chick. No doubt the first fact established for the eye was the bright spot on the retina, which, when the bird moved, caused the eye to move. The bright point fixed the eye, but the succeeding or concomitant image was like the light in its effects phenomenal, and knowledge was gained by experience. This experience of space or the position occupied by a body in space gained chiefly by muscle supplemented by skin and other sense nerves, as has been often stated, but an amoeba learns the conditions of a body by its body mass regis-

tered by the nucleus, it may be just such an amount of the amoeba is involved in moving over or around a surface as is required for the purpose. The amount brought into direct action must be different for different objects, as its irritability for odorous substances must be diffeant in accordance with the amount and the variety.

And so in the higher muscles, the degree of contraction or relaxation and the degree of elongation or shortening tells the size of an object. If A.B. be a bar horizontally fixed and C.D. a bar vertically fixed. An elastic band A.D, is stretched when the point D. is moved to *d*, and shortened when the point D. is moved to *d*,.

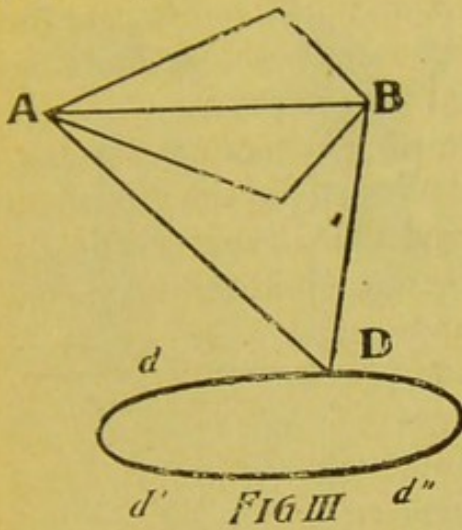
There is no kerkiness in the pendular movement, the tension of the bands serves to secure a continuous forceful resistance in the passive movement, and where elastic bands take the place of muscles, or muscles become short compared with tendons the same ligamentous security and forceful steadiness is obtained. Notice the hip-joint muscles in man, and the elastic interlamellar vertical ligaments or the Ligamentum nuchal of ruminants, and the flexor carpi radialis in the elephant. In the swing of a limb backwards and forwards, of the hand of the elephant down and up, the pendulum arrangement is maintained, and this movement, as in the fig., is as accurate a register of time as an ordinary pendulum, if one has means to calculate the tensions. The tension of A.D. resists and so does B.A. What then is the meaning of the movement of D? It goes through *d d'* in a time *t*, and *t* registers the force used in lengthening or shortening the bands, and the force of gravity, assuming the friction at the hinge joint to be noting. A point at D in moving describes a line: One never or seldom thinks of a line as anything but an extended tracing of a point, and yet the idea of motion is rarely considered as embodied in every primary conception of a line. The word primary is here used because the line as learned by a mind more or less mature, or on the high road to matury, is simply understood from its image or its image in the retina. If we attach a rod to a ceiling of a room by one and fix four (4) elastic bands to this vertical line.



*Fig II*

Then when D is moved round the curve D I *d' d''* the bands are stretched differently at different times. The line represented by the circle is produced here again. The time occupied by the moving body which is clearly dependent on the force and the resistance, but increases with the former and is inversely as the latter. The first idea of the

curved line is movement, and is in geometrical discussions and most physiological applications overlooked. It is quite true that many of



our great Physiologists who have taken up this question have been led to the conclusion that muscle movement is not quite a simple or complex arrangement for inducing motion or lifting weights. But the muscle movement, whether it registers itself or not, enables a man or animal to judge the superficial or solid contents of an object which the eye registers. If the elastic bands were made to record their work they would record their time or movement. Time, therefore,

may easily be shown to be the essence of movement.

The movement of D by enabling the bands to register spatial quality really enables them to register time. Space has one quality that may be called invariable, that is fixity. Space may be called the essence of fixation.

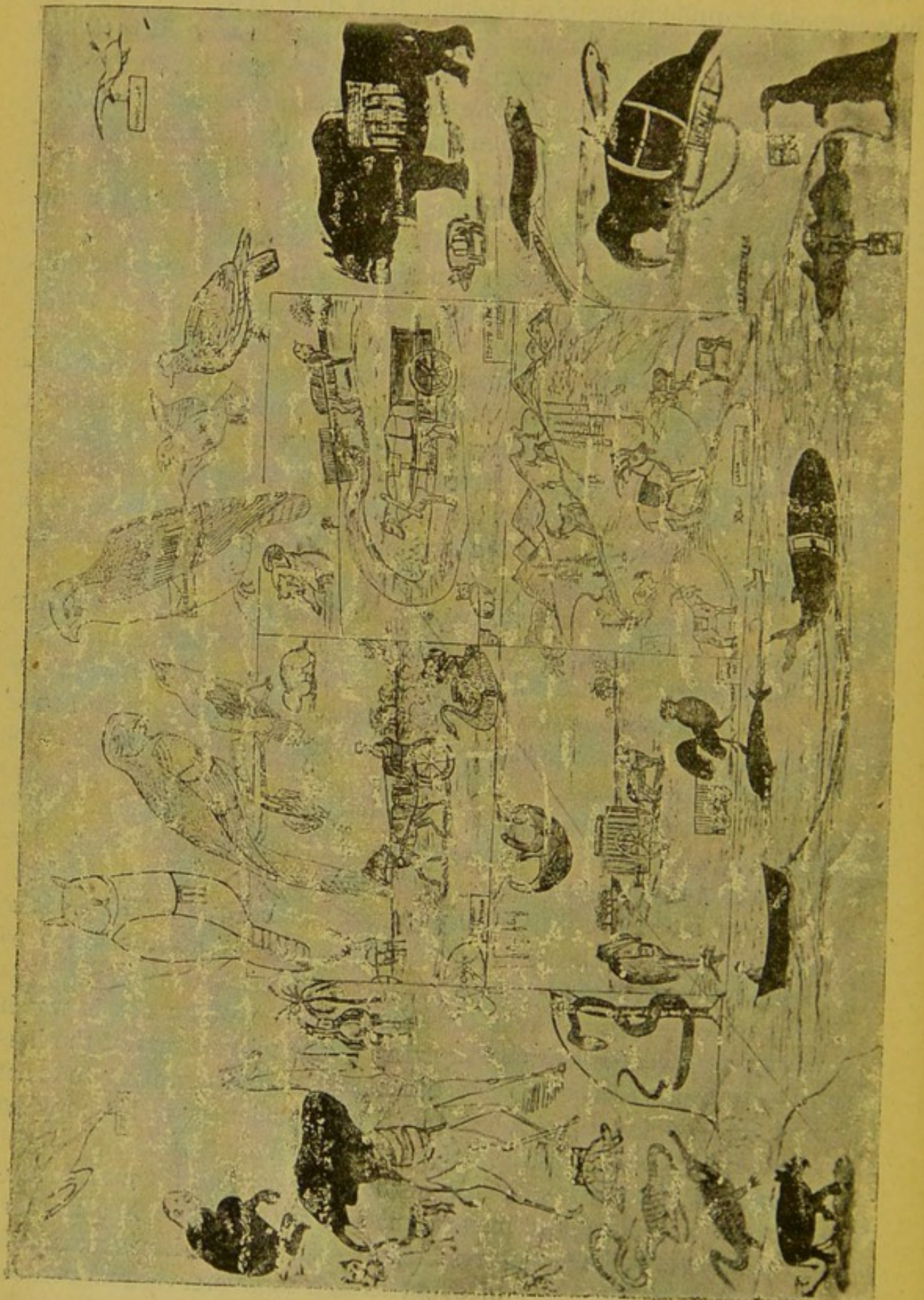
Fixation is for the young animal the starting point, but its vitality is conditioned by and condition motion, by the latter the animal begins to know that time has for it begun. In the circuit over which it moves hosts of sensations become interpreted by the muscle sense worked by the contracting muscle. The moving muscle always involves time as a condition.

Thence there is a good physiological as well as geometrical basis for educating young animals and children in hand movements by inducing passive movements of a particular kind. The principle of holding the hand has much philosophy to recommend it, and the trainer unconsciously attaches (he has, indeed, to attach) much importance to this method of instruction.

It is well known in children that the imitation of an act is much more efficient than the simple following of the movements of the instructor with the eye, and this is again better than attempting to learn the thing already found by referring it to experience or by copying although this is good.

But enough is not yet made out of the power which the muscle sense has to register, alone, or in conjunction with other sense nerves, passive movements. The registry of their own tension is a remarkable function either by their own efforts through their nerves and central nerve cell groups, and this register appears to emanate from the neuromuscular system.

MINERVA I.



ERMÜDUNG

The suggestive lecture given by Lauder Brunton some years ago at the Royal Medical Society of Edinburgh, although given for a specific object, may be here used to illustrate the importance of this early training. He suggests that in two of Raphael's celebrated pictures the succession of events is marked by certain muscle movements, and these have their centres of stimulation in the cerebrum successional. Sir Lauder Brunton, whilst thus appealing to the student who wished to have a mnemonic to aid him in localizing the motor centres for examination purposes; shows the importance of consecutive movements in relation to consecutive brain centres. But it is of the greatest interest that Darwin or Robinson and various physiologists have shown the continuity of certain actions responding to certain emotions. This seems like a thrice told tale, but I merely wish to touch upon this fringe of a subject that has to do with the mental as opposed to the emotional activities. I take it that in the training of animals the proper rules should be.

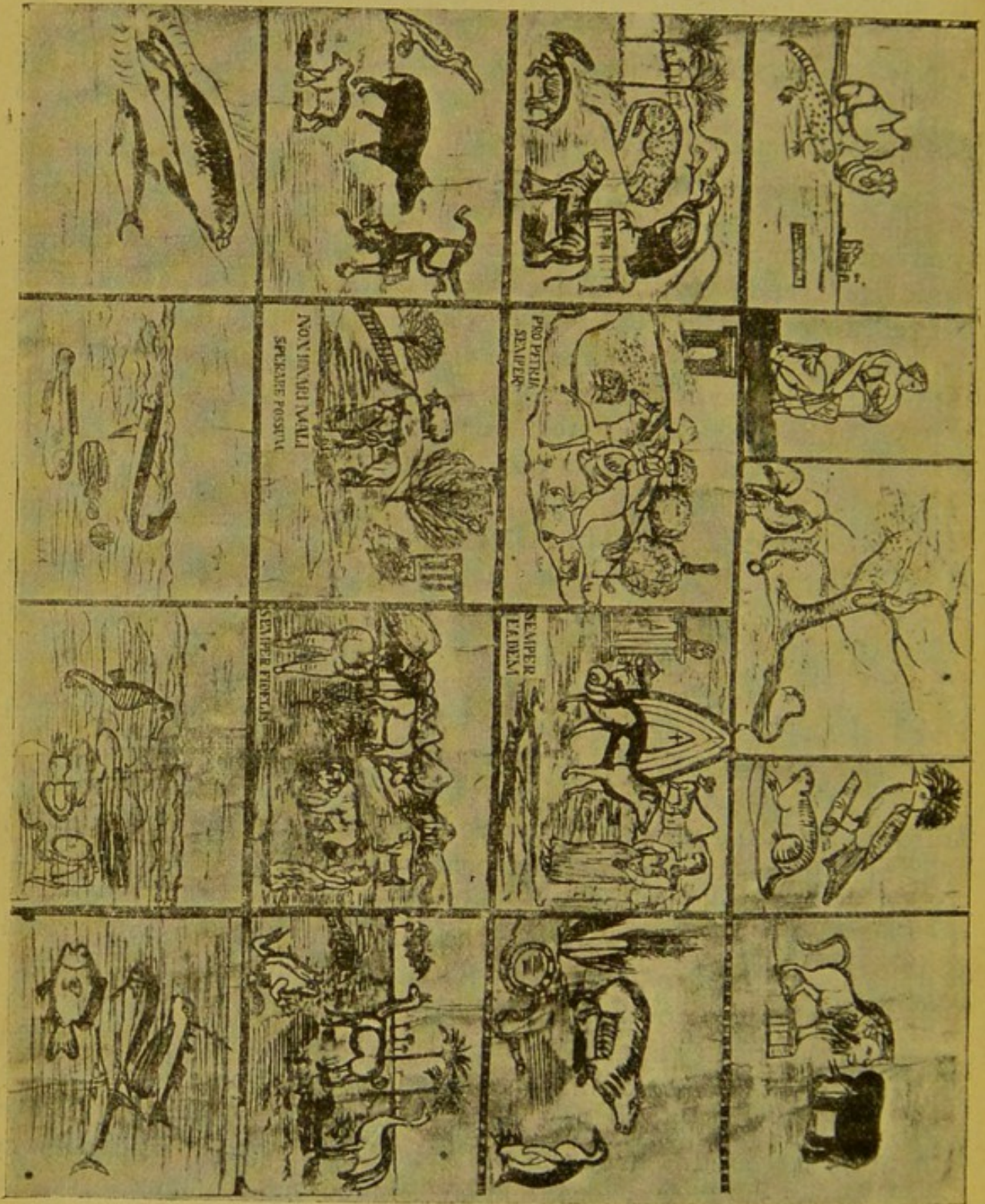
- (1) Sanitary conditions must be attended to.
- (2) Secondly odors, sights and sounds, suggestive in themselves, though apparently harmless, may be evidently for some and profoundly for others detrimental in the young state.
- (3) That whilst for young animals and children some impressions are transitional, they may cease to be so if repeated often.
- (4) The sense of touch may lead to vicious results, although so beneficial in some, just as opium is advantageous or useful.
- (5) The sanitary, including physical environment, being regulated properly the actual mental (including physical) training comes in.
- (6) This mental quasi-physical training should be best regulated by the muscles being used as if they were elastic bands joining the bones, and that systematic passive movements should be used in children judiciously and with definite objects in view.

The training of the muscles of the hands may thus be commenced before an appreciable tendency to imitate has gained habits that fructify in after years. Some of the ordinary movements are taught very much in this way as soon as an animal (such as young children) begin to move their parts co-ordinately. By an extension of this some of the simpler muscle groups at first and then those of greater complexity might be exercised. The advent of the imitative faculty will increase the scope of one's operations, and by eliminating the muscle action pose or tone that are associated with vicious or undesirable actions or mental states (See Darwin «on the Emotions»). By the opportunity being afforded to the young of studying or imitating the pose, features, voice and movements, that are known to be associated with coherency of action and thought.



# Æsculapius. II.

## VINCIT



ERHOLIMG  
und **Hellen.**