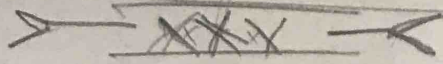


Q/ Some aspects of Central Nervous Development and Function
 as indicated by results of nerve and muscle transplantation



Define muscle trans-
 & nerve crossing

how functional adjt
 is required.

Expt of Marina - oft-quoted - a good place to start

Concerned w. eye ball mainto & coord. of ocular m's

Eye ball - 6 muscles - can see clumps of motor cells

Ball thrown about very accurately -

where is the center that has charge - control of
 the impulses?

Search been unfruitful

Transplanted m's - 3-4 days, eyes moved OK.

N.S. as telephone system, reflex connections,
 Sherrington's ideas of integrative action of n. syst

Impossible explain Marina's results in terms of
 fixed, predetermined pathways.

Plca for new physiol. of C.N.S.

Based not only on his own results, but others, in fact
 a large no:

- 1841/1842 Flourens - chicken
- 1886 Stepani - flex & ext. n.s. forelimb of dog
- 1885 Rana - " " foot m's in pigs, rabbits, cats, dogs
- 1897 Kennedy - dog sciatic rotated forelimb of dog
- 1901 Kennedy - " " " " " " " "
- 1905 Bethe - crossed sciatics
- 1908 Spitzgl - n.s. for flex & exts of foot & arm in man
- 1910 Osh & Kil - " " from left to right side forelimb of dog
- 1911 Kennedy - sp. - fore. in man, & dogs & monkeys
- 1911 Mareglia - true lateral, but not clear, no ext
- 1914 Kennedy - split sciatic in dogs - flex & ext to flex. m. & ext. m's
- ≡ conclusions but Marina must not pres. sphere thoroughly - stands out w. eye muscles
- live Marina
- 1929 Kee - review of nerve regeneration
- 1930 - Frazier - accessory - facial & straight sutures - cortex - q - motor reorg
- 1931 - Bethe - review support
- 1934 - Carrage - fore & hind limb of rats - makes coord. as good as preexisting
- 1934 - Mangoff - dog
- 1935 - Anshkin - trans. hic. fun. m's (phylogenetic relation of spinal cord) - not found as locally assumed
- 1936 - Osh & Kil - repeated Marina's dogs & cats
- 1937 - Haldstein - clinical reports of trans. m's in man - all briefly by saying injured, received, no practice.

2) Says old reflexology built on spinal prepar. under artificial condit. give impression of specific reflex connections. Classical reflex go into response (ex. ^{beethoven} piano hand). As long as have same connections, doesn't matter what they are.

Various ideas as to how explain c.n. function. if drop reflex connection idea - all vague.

Rely on peripheral, ^{or central} control, certain natural state for organism & it comes to this equilibrium regardless of type of central connections.

Cadwell - instantaneous need & aim of organism determines result.

Bethe - retroactive sensory control, "sundomobility" takes patients.

All got away from emphasis on anatomical relations & turn to dynamics. patterns

When I started to work on this prob. fall of '38. took for granted, on basis of literature, that readjustment would occur, was interested in analysing the ^{no time} adjustment by brain lesions, cord transection, etc. with ref. to certain other prob.s of development of c.n.s. which I'll mention later

started out traupg's slide

got reversal of max't, 1st time out out other next nerve cross " " " " " " use ind. m. & " " "

Trained & could get no correction, machine-like perverse.

Picture - slide first central whist story there next, slides, show what to look for "insects"

Turned to forelimb:

Operations. slides

Results \Leftarrow

pegging, failures of trunk adj't

Pictures

Subordination that results is irreparable.

3) Reconciliation of these results w. previous
 Results due to difference of technique — care in avoiding trunk marks
 — " " dissecting out single nerves.
 — " controls all along.

Dogs w. sciatic cut show nothing
 Same " fore limb expts.

- Some of reports that coincide
- 1885 Kieckhefer — vagus to hypoglossal in dogs ably. & marks acid
 - 1898 Cunningham — flex-ext. on dogs
 - 1932 Ballance — persisted over a year in baboons
 facial acid marks in man we do not know
 whether ever disappear or not.
 - 1934 Viki —
 - 1935 Taylor — big fem to quadriceps — no dissociation in man
 repeated attempts
 - 1938 Scherb — denies immed. record. All cases entire Sin
 - 1938 Ford & Woodhall — question general assumption
 - 1938 Bender & Fulton — no record in eye m's after n. regen. mark.
 - 1940 Olmsted & Watrous — no deep spinal record after eye n. trans. in
 rabbits
 under anesth. at least.
 & per. m in dogs

On other hand there are many more lesser reports of adjt
 partic. clinical that I could not go over. If upheld fairly,
 say more confirmation of rat work is needed before can
 change their views. I myself, however, am convinced
 that nerve & muscle cross expts in higher vertebrates
 contrary to demanding a revision of old reflex connection idea,
 support it more strikingly than any other evidence.

Sensory Nerve Crosses

possibly get quite diff't results from motor crossing

- Mixed n.s crossed but little attention paid to results of sensory
 except where crossed from one limb to another.
- 1905 Bethe sciatic — but did not weaken his connection
 - 1934 Cavan fore-limb
 - 1935 Anokhin vagus
 - 1940 Ballance (test recovery)
 - 1940 Scherb (evidence of adjt to proprioceptive)
 - 1940 Scherb (clinical cases & studies)
 - 1940 Scherb (referred sensations — usual misappnt)
 - 1940 Scherb (Optic n. regeneration)

4) Skin transplants Purdy, Douglas & Kanier
Phantom limbs
Heres & Pseudophones of surgical translocations.

Reports are rather inconsistent, vary from ext. recit. at
spinal level in lower mammals to persistent illusions ⁱⁿ _{man}

Series of sensory nerve crosses last fall

supral	n.	—	operation & effect of it
later. plantar	n.	—	
med. "	n.	—	
saphenous	n.	—	
(peroneal	n.	not crossed)	

16 came thru OK.

2 w. mixed R's

5 " left ft intact

9 " L ampd.

Description of R's

Influence of Training

Can't say yet whether training will ever occur or
not, but the results so far indicate the presence of
definite, stable, reflex mechanisms ^{as} Goldstein, Bethet
others. Not the adequacy of the effect that counts.

51)

Development

After having just said that these expts are convincing to me that reflex connection idea is correct going to open up the subject to question again from another pt of view.