The Characters and Properties of the Physostigma Venenosum.

Thomas R. Fraser.

1862

Society is acquiring much to the increase of Geographical discovery & Exploration, has been, in a measure, repaid by the acquisition of numerous substances, which have proved of great service to man in a civilized state. There can be little doubt that there have been observed and described a very large number of substances which could still with great advantage be added to our list of economic materials, & more especially a large number which would be of Therapeutic value, & the study of whose properties would without fail indicate virtues important to Medicine.

Withi

p.p: 319, 320, 321 Edin: New Philos: Journal.
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Within a comparatively recent period, a certain amount of attention has been directed to the use of a leguminous plant of West Africa — the Ordeal-bean of Calabar.

First scientifically noticed by Dr Daniell about the year 1840 & alluded to in a Paper read by him before the Ethnological Society in 1846, the attention of Europeans residing in this district, & more especially of the various Missionaries who are there stationed, has been attracted to it. And, indeed, its virulence as a poison, & the savage barbarity of its employment are of themselves sufficient points of attraction. The bean is used almost only as a state poison; as a supposed means of discovering crime, & a certain method of punishing it — suspicion being in itself a cause of death.

The mode of trial by ordeal is of extremely ancient origin. It may be stated generally to have existed in every race & country during its stage of infantile barbarity. In the history of probably every nation such a method of judicial inquiry will be found to have preceded

1st Antigone of Sophocles.

2d Numbers. Chapt: X.

preceded the state of civilization. As real civilization — including under this term a religious, as well as a social & intellectual enlightenment — has been established such trial has been invariably abolished. It is founded on an arrogant appeal to direct divine interposition, which no system of Theology can ever recognise without direct authority, & conjoined with this, on superstitious ignorance, which civilization has unmasked, for knowledge disproves the power of any material agency thus to discriminate between innocence & crime.

The ancient annals of Greece show its existence. In Rome it was frequently employed, as in the appeal to single combat.

In the Bible perhaps the earliest account of such trial is to be found, where a cup of "bitter-water" is commanded to be drunk in the discovery of conjugal unfaithfulness. In India & China, in Japan, Persia, Java, Canary Islands, Sardinia & many other places, various forms of Ordeal were, & are yet unhappily, employed. And in our own country the

Practice

1 In England various forms were employed. We may mention the "Corsned" or trial by consecrated bread & cheese which is historically famous, by having caused the death of Goodwine Earl of Kent in the reign of Edward the Confessor. His Peer was accused of the murder of the King's brother appealed to the "Corsned", & was choked. Bells Commentaries.

2 "The travels of two Mahommedans through India & China". translated by the Abbé Renaudot. Vol: VI. Pinkertons' Travels.

3 Carron's "Account of Japan".

practice existed to a great extent until the 13th Century when a law was passed in the reign of Henry III. for ever abolishing the trial by ordeal.

It would occupy too much space to attempt to state the many ingenious methods which were made use of in such trials. They may be naturally classified into two great divisions:— those whose application was external, & those in which some substance was introduced into the system, or the internal.

The first includes the well known trials by fire, water, the combat, & the balance.

A trial by fire is still employed in China where the accused is obliged to walk for a certain time with some form of leaden covering the hand, or which a red hot bar of iron is placed. The hand is then put into a bag & examined in three days, if no injury is apparent the accused is released & the accuser punished.

In Japan the following is described as the method of discovering a thief. The accused holds in his hand a piece of Chinese paper, on which

1 Capt. Hamiltons "Account of the East Indies."

2 Symes "Embassy to Ava".

which are printed monstrous figures. And
not now placed on this, ~~Paper~~ the paper is
burnt, but the hand is not injured if the
accusation is false.

The trial by water is frequently employed
in Pegu in the following manner. The accused
& accuser take hold of a stake which is placed
in a Tub of water, immerse their heads
at a given signal, & according to the
length of this immersion judgement is pro-
nounced, the shorter time being a sign of
guilt. This is also adopted as an
ordeal in Siam, & is founded on an ex-
planation which is at least ingenious. The
Siamese suppose that the Devil torments
the guilty under water & therefore, he who
has nothing to fear, remains longest.

The second Class comprises
perhaps more curious & ingenious varieties
of such trials, & it includes the large
section of the Vegetable ordeal poisons.
This description of ordeal prevails, as might
be expected, in the Tropical & warmer latitudes,
Where

1 Capt. Hamilton's "Account of the East Indies."

2 Merolla's "Voyage to Congo."

plants containing principles of active energy on the living textures are more abundantly to be met with.

An ingenious method is practised among the natives of the East Indies. The accused and accuser are obliged to place some raw rice within mouths, which they are requested to chew & swallow. This supposed that the guilty will be unable to do this, & with some degree of reason, provided that the "nerve" of both is equal. For it is a well known fact that extreme mental agitation in very many cases checks secretion, & as the secretion of mucus & saliva is essential before deglutition can be performed, & we can understand how the guilt may in some cases cause such trepidation & be discovered.

At Coup, on the Senegal, all who are accused of treason or treachery are obliged to drink a Composition of "the juice of herbs, serpents flesh, pulp of fruit, & divers other things" which produces swooning or trembling immediately, if the accusation have any foundation.

1/ Mirolla. ibidem.

2/ Adventures of Andrew Battel.

Here,
ation. Throughout obviously, the trial is entirely
in the hands of the priests or "Cangazumbo," and
according to the ingredients he may employ, so
will be the results.

To discover dealings with a devil the root
of atuu, called "Neassa", is heated with cold
water, & the liquid drunk by the accused.
If syncope is produced, the crime is supposed
to be proved. This plant is pretty tall, &
has a red colour. It appears to possess valu-
able properties as a narcotic & anodyne, & is
employed with great benefit in toothache
and sore gums. Its narcotic properties
according to the description of Merolla are
unequalled in the Vegetable kingdom, as that
author says, "so pernicious is it to birds that
they fly from it, for if they settle on its
branches they immediately fall down
dead" (!)

In Angola a root called "Imbando"
is scraped in water & drunk. Its virtue
is said to reside in the property of causing
a brisk Diuresis, if too much water
is employed. If the quantity be below

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1 Proyarts "History of Loango &c".

2 Professor Balfour. "Transact. of the Roy. Society of Edinburgh" Vol: XXII. Part II. p: 305.

3 Dr Winterbottom "Account of the Native Africans in the Neighbourhood of Sierra Leone. Vol: p. 160. Roy. Christison. p. 193. Month: Med: Journal. V. XX.

4 Lee: Rev. "Gardner's Dictionary". Vol: II. p. 634.

5 "Explorations & Adventures in Equatorial Africa" by Paul B. Du Chaillu. p. 394-399.

below a certain amount, death is produced by Coma.

#1 In Loango, an infusion from a wood, called "Kassa", is drunk. Its effects are to cause either vomiting or insensibility: the latter is regarded as a sign of guilt.

#2 On the East coast of Africa a poison of notorious virulence — the Tanghin poison nut of Madagascar — serves as an ordeal.

#3 In the neighbourhood of Sierra Leone an infusion called "Red water, from the bark of a tree known as "Kwon, Okwori or Millee" is administered. The infusion may cause immediate death or purging & Emesis, the two latter being looked upon as signs of innocence.

#4 ~~Among the natives of~~ According to Don this plant is also employed in Western & Central Africa.

#5 Among the natives of the river Rembo — the Obindji, Gommbi, Bokulas, &c — in West africa, near Cape Lopez, Du Chaillu describes an infusion of the scraped root of the "Mboundou" which

is

"Travels in South & Interior Africa". p. 621.

is employed to confer the power of divination on the Medicine men or "Inyanga" and to assist in judicial enquiries. The Plant is described as belonging to the natural Order Loganiaceae & closely resembling the Strychnaceae. Its infusion is red, & it has narcotic properties.

Dr Livingston, in his travels in South & Central Africa, met with many instances of this custom, and has given details to the Extent of imputing the practice to all the Negro nations north of the Zambesi.

There can be little doubt that the system of trial by Ordeal is almost invariably an imposition, employed by the Priests as a tool to serve their ends, and maintain their sway over the minds of the vulgar. We find, confining our attention to Britain, that, immediately after the repeal of this practice, various treatises were written by the Priests, exposing an Elaborate system of deceit, & shewing that many

many devices were known by which Every Ordeal might be successfully undergone.

There is also good reason to suppose, that the medicine men of the most remote tribes of Central Africa, have their methods of deceiving the uninitiated, even to the extent of enduring their most violent poisons unhurt. Du Chaillu has mentioned that the medicine men of some of the tribes on the Rembo were in the habit of asserting their power & gaining a supernatural fame, by swallowing large doses of an Ordeal poison which has been already alluded to — the "Mbondi" —, without any fatal results; & interesting results are given of one such exhibition. We must suppose that some essential change was produced in the poison in such cases, & if the means of producing this be known, we must infer that it was employed in all those cases where the trial has been apparently undergone with success.

The

The general rationale of the use of the ordeal will be more satisfactorily explained by entering in a few of the details of its employment at Calabar.

The region included in the term Calabar, occupies a district of West Africa, in the neighbourhood of the Bight of Biafra, & extending along the Coast of a considerable way, the "Rio Caltary", "Old Calabar" or "Rude Calbongh". Its boundaries are indefinite, it may be reckoned to have a length of 100 miles & a breadth of 50, & is situate between 4° & 8° N. Lat. & 6° & 12 E. long.

The natives are an offset from the "Ibabio" tribe, who inhabit a region extending westward from Calabar to the river Nigir. The Government is oligarchical, several Chiefs rule each town, which form almost independent governments, joining together for the common good in time of danger, & possessing a common Council. This is presided over by one of

of this number who on account receives the title of king, tho' he possesses no special authority, & has no jurisdiction beyond his own village. Neither authority with these petty kings nor the Medicine men Doctors, or Wizards, whose duties include the Conduction of the usual round of processions, sacrifices, feasts, incantations, & the other barbarous jiggleries of heathenism.

In this condition of ignorance superstition reigns supreme. Everything unexplainable, & all that occurs beyond the ordinary course of things — Events even of every day occurrence as sorrow, joy, disease, & death —, are ascribed to the mysterious agency of witchcraft. And it is for the discovery of this evil genius that the discriminating property of the Ordeal bean is required.

Any person may lay a complaint against another. The charge is made before one of the chiefs of the village. A council of neighboring chiefs is called, the accusation is heard, & the

reasons

reasons in support are stated. The accused is then asked for his or her defence; the answer is invariably a demand for "Chop nut," which is always granted. The ordeal is given in the most public part of the town, and the whole proceedings are watched by a crowd of onlookers. The Priest, as administrator, offers up a prayer that the Gods may continue to the bean its power to kill the guilty. The accused is then permitted to eat the Ordeal bean, either in the form of an infusion, or by simply chewing the kernal. Sometimes a portion of one is only taken, at others as many as twenty-five; according to the will of the priest, or until innocence is declared by the production of Emetic, or death proves the guilt of the accused. The Medicine Men are by no means scrupulous in the accomplishment of their object, if from any cause they desire the death of their victim, a Club is employed to hasten the action of the poison.

Should the accused escape, the person bring the charge is liable to undergo the same

some trial, to shew that he does not possess "fremason" against the accused. A salutary check is thus placed on treachery or private Splean.

The confidence of the natives with power of the bean is remarkable. They do not believe that any poisonous virtue re sides in it, or even that the bean possesses any disagreable or dangerous properties, but consider it an instrument employed by the gods to shew who is & who is not guilty. The evident denial which is given to such a theory by the fatal effects which are known to be produced when the administration is without the sanction of a chief, & therefore illegal, seems in violence of this strict rules of trial, is overcome in a very simple & ingenious manner. In such cases the administration is regarded as a murder, & punishment follows. The gods are displeased be cause the victim consented to eat, & kill him; they are also aware that such a death will be investigated by the chiefs, and

and so they make sure that the administrator will be charged with murder & executed. They thus endeavour to harmonize their view of the innocence character of the ~~poison~~ per se, & the fatal effects of the administration, irrespective of legal trials.

The number of deaths by this ordeal must be very considerable ~~from~~ since the efforts of a large & ~~influential~~ body of missionaries have been directed against the custom. The population of Calabar is roughly estimated at 100,000 & in the 6th of one missionary — the Rev. D. Anderson — ~~of~~ returns made to ten deaths by the ordeal between the 19th of April 1860 & the 10th of May of the same year, or about 120 per annum, which yields an average percentage of 1.2.

Botany.

The bean is the product of a Leguminous plant, the Physostigma Venenosum (Balfour), found in the neighbourhood & to the West of Calabar Proper, in the territory of a tribe called Ebee (Ebio, Abee, Abo, & Ibo), Westward from the source of the Niger. It is extremely probable that its habitat is more extensive. It is described as a Leguminous plant having the characters of a runner, climbing on the bushes & trees in its neighbourhood, & this character was well shown in the two plants which were for some time successfully grown in the Edinburgh Botanical Gardens. It inhabits the sides & Edges of streams, thriving best in swampy riverbanks. So close to the waters Edges does it grow that the ripe beans are frequently dropped into the river & carried down to Calabar in considerable quantity, so much so indeed that the natives obtain their supply principally from this source, irrespective of what is used judicially by the Ibo priests (Mbia-idiong). From this source

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seeds I am also indebted for one of the parcels of the seeds received from the Rev. Mr. John Baillie, at a time when the head king had taken "Eyeo", forbidding the giving of any to white men, & when that gentleman succeeded in obtaining about 300 with the assistance of a few boys, "on the beaches of the river, where you always find a few".

The plant is perennial, probably producing fruit only after some years.

The fruit ripens at all seasons of the year, in common with many other tropical plants, but the most abundant crop is produced in the rainy season between June and Sept. Inclusive inclusive.

The following botanical details are extracted from Professor Balfour's Ethnethic paper in the Transactions of the Roy. Society of Edin.

Natural order. Leguminosae. sub
Sub order. Papilionaceae. Tribe. Euphaseolae.
Genus & species. Physostigma Venenosum.
It has generic characters closely resembling those of Mucuna & Phaseolus, but is separated from the former by the characters of the flower & pod, & from

from the latter by its seed. It has accordingly been placed by Prof. Balfour in a separate genus, Physostigma, & is itself the only known species, V. venenosum.

Generic characters.

"Root spreading, with numerous fibrils, often having small succulent tubers attached".....

Inflorescence, axillary or pendulous multiflora racemes; rachis of raceme zig-zag & knotty.

Calyx, campanulate, four-cleft at apex, the upper division being notched, & ciliated its segments

Corolla papilionaceous, veined with a pale pink, having a purplish tinge, & covering a crescentic mamma.

Vexillum external, large, completely covering the other parts of the flower in aestivation.

Alae large, more deeply colored than other parts of the flower, obovate-oblong, curved.

Carina, keel before, prolonged upwards into a narrow rostrum.

Stamens ten, diadelphous. (Diadelphia)

Disk at base of ovary, thickened with a sheath extending upwards over the gynophore.

Pistil more than one.

Stigma

Stigma, blunt, covered by a remarkable reticulated sac or hood, which extends along the upper part of the convexity of the Style; having a resemblance to an Admiral's flat Hat in a jaunty manner.

Legume, dark brown & straight when mature, about seven inches in length, elliptico-oblong with an apicular recurved point, & with outer & inner integument easily separable.

Seeds, two or three, separated from each other by a pulpy cellular substance.

The part of the plant of interest on account of my known properties is the Seed or Bean.

Synonyms. Ignis nut; the Bean of the Ste Ignace. the Ordeal Bean of Calabar. Chop nut.

Characters. &

Form. Irregular Uniform, or having the appearance of a somewhat flattened fusiform body, blunt at one of its Edges.

Colour. As obtained from Calabar the beans have a grey Colour, & are incrusted with earthy matter. This latter is easily removed by washing & a somewhat shining integument is exposed, of various shades

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of brown, ranging from a light coffee to
an almost perfect black.
It has a concave
Sulcus. In the convex edge, a furrow or
sulcus exists, with elevated edges, having
externally a reddish black line, & generally
brownish & with a shade of yellow ~~internally~~
within the sulcus. This sulcus extends unequally
towards the extremities: at the more extended
portion it ~~runs~~ extends along a portion of the
extremity of the beak, & terminates in a narrow
furrow; at the shorter end it shows a more
rounded termination & is pierced by a foramen.
The bottom of the sulcus is of a grey or
reddish black colour, & has two slight paral-
lel markings extending down its centre.
Dimensions. The average length is about
1 1/16 ~~1 1/16~~ ths of an inch, & varies from ~~one~~ one
inch to one & eight sixteenths.
The average breadth is twelve sixteenths of an
inch, & varying from ten to fourteen sixteenths.
These measurements are the extremes in each
direction, & the sides slope from this greatest
breadth to the comparatively narrow extremi-
ties.

The

The beam may be exposed to the action of cold water for a long time without undergoing any change. I have carefully weighed & measured a beam & placed it in covered Vessel containing water in which it was left for four months. When examined no change had been observed in the weight or dimensions of the Beam.

The average thickness, or breadth from one flattened side to the other, is Eight sixteenths (8/16) of an inch; the maximum Eleven sixteenths, & the minimum Six sixteenths.

Weight. The Specific gravity is less than that of Spring Water, & we can thus understand how they should be conveyed down the rivers to the Sea coast. A very few however sink in distilled water, out of three hundred ~~[illegible]~~ I have found Eighteen such, or 6 per cent.

The Bean weighs on an average 63.263 grains; the greatest weight met with was 94 grs, & the least 25 grains.

When the Covering was removed from the bean, the kernal was found to weigh on an average 46.2 grs, varying from 21 to 73 grs; & the Spermoderm 16.73 grs, varying from 13 to 19 grs.

The external tegument is of great hardness & toughness; it is with difficulty cut with a sharp knife & requires considerable force to break in a Mortar.

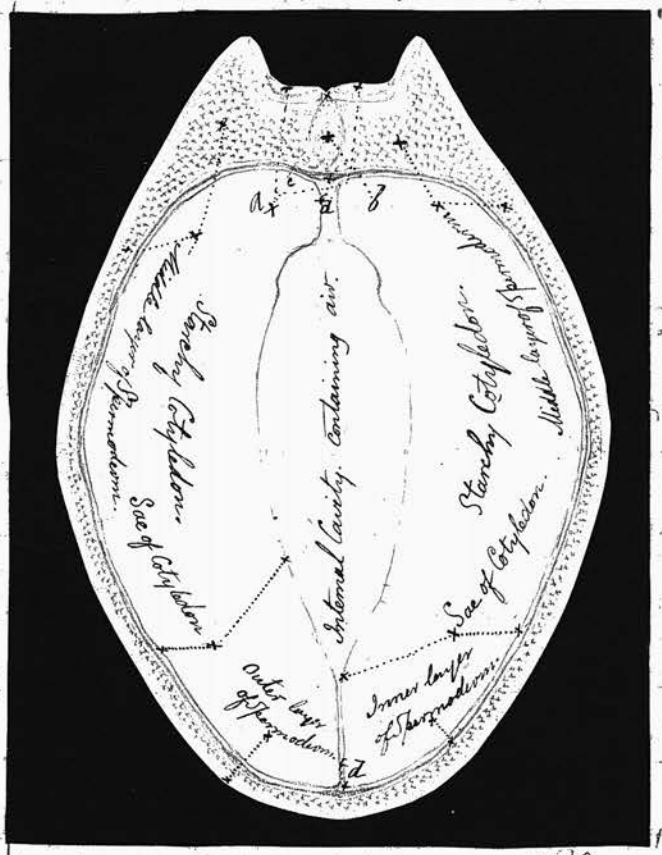
Its internal surface is of a bluish grey colour.

When

† See note in following page.

Figure I.

Transverse Section of the bean of Physost. Ven.
Diagramatic – magnified four times.



* See Microscopic Preparation No I.

when exposed to a temperature of 212°, or the action of steam for a few hours, the beans shells, by imbibing a quantity of water, which may be found in the central cavity, & the Spermoderm becomes soft & may be cut into sections with a knife. If the heat be prolonged the Spermoderm cracks & fissures, & the colour of the kernel is changed from a yellowish white to a brownish colour. A roasted portion has also a distinct odour of Cocoa.

When a transverse Section of the Spermoderm is examined microscopically, the following structures are shewn.

1. At the bottom of the enlarged hilum two structures separated in the median line, & the testing a considerable way up the sides of the sulcus & forming its floor. They are about $\frac{1}{15}$ th of an inch in perpendicular thickness at the centre, & taper towards the sides. They consist of an aggregation of rods, each extending through the whole depth of the sulcus, & terminating at both Ends in thickened extremities. (Fig I a. & Preparation, No I)

2. Outer layer of the Spermoderm. This very

See previous page

The following was the change produced by exposure to the action of steam for four hours.

Before	After
Weight 74 grs.	Weight 140 grs.
Length 13/8 inch	Length 1 1/8th of an inch
Breadth 6/8ths inch	Breadth 7.5/8ths "
Width 5/8ths inch	Width 6/8ths "
Bulk? 2.5/10 Cubic inch	Bulk (?) 5/10ths Cubic inch

Water could be easily squeezed out, & exuded spontaneously from the foramen at the shorter end of the tubers.

very similar in structure to the above, & forms the external envelope & outmost layer of the Spermoderm. It extends over the entire surface of the seed except at the floor of the chalaza where a division occurs forming the external orifice of an opening.

This between the 1/38 & 1/114 th of an inch in perpendicular thickness, & consists of a number of rods placed side by side; each rod being about the 1/2250 th of an inch in thickness, & terminated with broad extremities

3 Internal to this is the middle & principal layer of the Spermoderm

It varies in thickness in different places, from the 1/8 th to the 1/30 th of an inch, having its smallest measurement at the narrow convex edge & its greatest at the hilum.

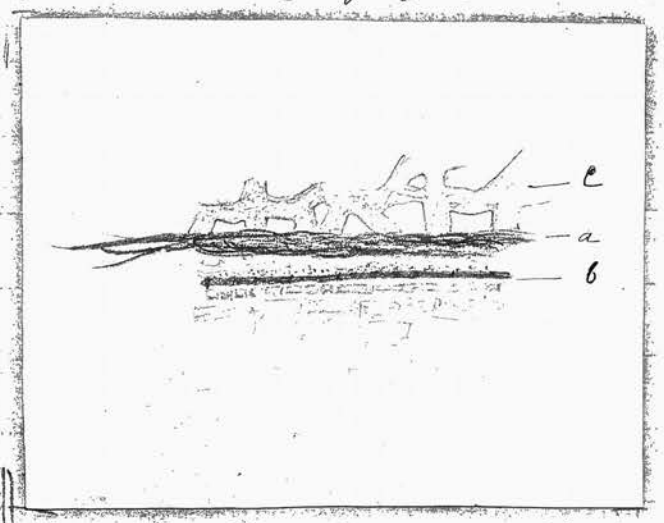
Its structure is cellular (See preparation No 2 Fig I & IIc) having consisting of an aggregation of stellate cells, having six or eight branches, which communicate with those of neighbouring cells. The cells are of a brown color. They diminish in size & in the length of their branches as they approach the exterior where they appear to form a separate membrane.

brane (See Preparations I. & II),
which is in reality a compressed layer collection
of these cells, & extends on the exterior of
the middle coat of the Spermoderm, over
the fibro vascular Structure (Fig III. a; & I, b.)
& from this probably to the inner margin of
this (the middle) layer.

4. Inner coat of the Spermoderm.
(Fig II. a Preparations 1 & 2).

It consists of dark leginous tissue, form-
ing a continuous layer immediately beneath

Figure II.
(Magnified 200 times)



the former varying from the $\frac{1}{470}$th to the $\frac{1}{20}$th
of an inch in thickness. The former is the general
measurement & the latter is the increased
thickness

thickness at the two edges where the Cotyledons approximate (Fig. I, a, d.) immediately below the Sulcus, & at the opposite margin.

5 A fibro-vascular texture, imbedded in the middle layer of the spermoderm.

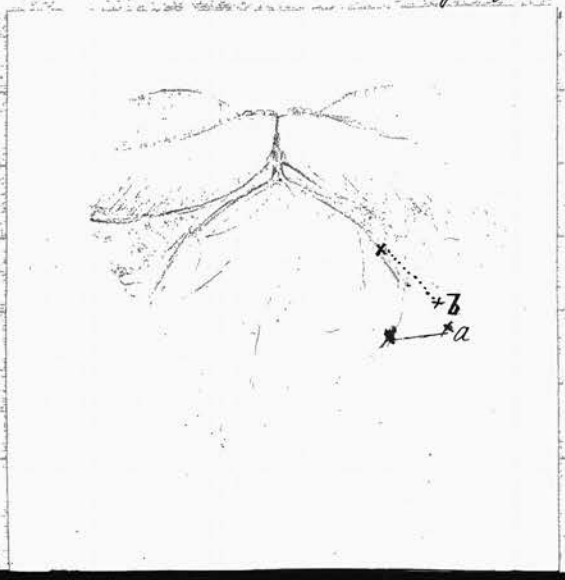
In a transverse section it seem to possess a somewhat elongated ovoidal form, & from its lighter colour is apparent to the naked eye. (Fig I. b., III. a. Microscopic Preparation No 1.)

It has a perpendicular diameter of from the 62nd to the 70th of an inch, & transversely from the 117th to the 130th of an inch. It extends, longitudinally, along the whole length of the Sulcus.

In a transverse section it appears to

Figure III.

(magnified 200)



6

to contain a number of irregularly oval cells, having their long diameter in the same direction as the containing structure. (Preparations I. & 2. Fig. III., a.) ~~Both~~ transverse markings, but in a longitudinal section these are seen to be scalariform vessels, varying in length from ~~the 180th to the 117th~~ of an inch & in breadth from the ~~1175th to the 2350th~~ of an inch (See Preparation No 3. & Fig. IV.)

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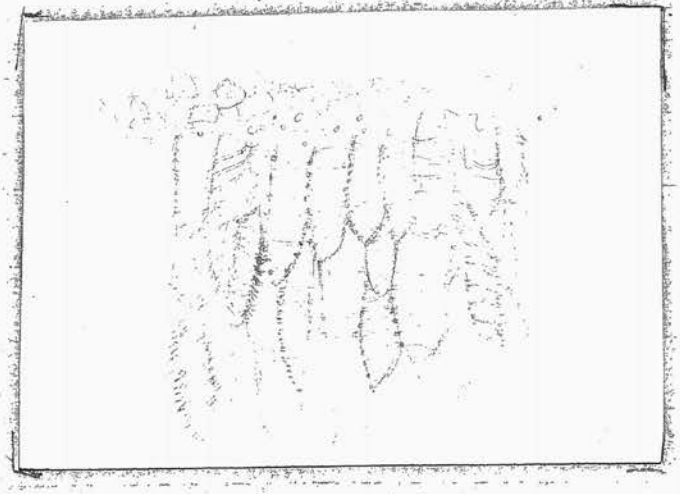
Figure IV.

(Magnified 200).



6 Sac of the Cotyledon

(Fig. II., 6. & Prepar. No 4.)

This closely invests the external surface of each Cotyledon, being in contact externally with

with the inner layer of the Spermoderm, abd with the sac of the other Cotyledon ~~both sacs forming~~ at the edges below the hilum, & at the opposite margin of the seam; both sacs forming the external wall of the air cavity. There are therefore two distinct sacs, one for each Cotyledon.

They are about the $\frac{1}{500}$ th of an inch thick, & consist of elongated cells placed in two rows, the outer ~~being~~ having cells longer & more narrow than the inner.

J. Kernall. It consists of two large Concavo-convex Cotyledons, of a creamy white colour, & easily broken in a Mortar & scraped with a knife. In a transverse section they are seen to be in close contact externally with the Spermoderm & internally to be quite separated from each other, except at the extremities & Edges of the seam (Fig: I.)

A large cavity is thus left in the centre which communicates with the external atmosphere by means of a minute foramen so small it

Narrow

* See Note 1.; page,

narrow as to give no opportunity for the escape of the contained air when the bean is immersed in water.

Microscopically the kernal consists of a cellular tissue, with cavities of a hexagonal, but often very irregular, & even of a one sided form.
(Fig V & Preparation No 4).

Figure V. magnified 200.

The cells vary in diameter from the 1/650th to the 1/40th of an inch; those placed externally being the smallest, & ~~varying~~ becoming elongated so as greatly to resemble the inner row of the sac (See Fig: II b).

These

These cells contain from one to six starch granules, which are readily detected by washing & give the usual reactions with Iodine, Bromine, & boiling water.

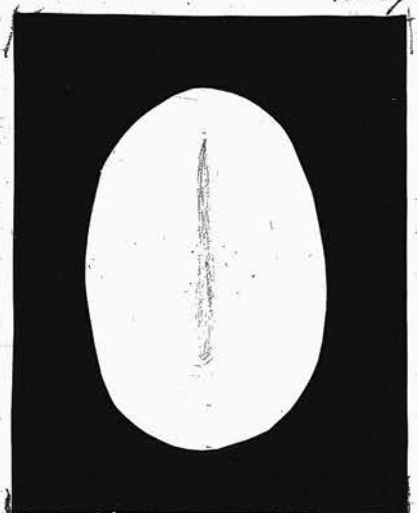
Their general form is an elongated oval frequently approaching an irregular uniform or rounded parallelogram.

Margin of the stained corpuscles is generally regular but often indentated.

The surface has in the majority of cases a central line with long axis, surrounded with concentric rings.

(Fig VI & Pap. No 5).

Figure VI. magnified 200.



Very frequently the central line is superseded by a dark space, containing amorphous granules

granules.

Occasionally dark radial lines, from the central line or space, are seen, extending more or less completely to the circumference, with a margin which withs on change with the focus; & presenting an appearance similar to a radial crack in a transparent sphere. These lines are broad at the centre, & narrow towards the circumference, & arise from various portions of the central line or space.

The central granular space has in general the configuration of the containing corpuscle, though often modified, & frequently of a quite cell form.

Length. The average length of the starch granule is $\frac{1}{440}$th of an inch; varying, in those which were measured, from $\frac{1}{700}$th to $\frac{1}{303}$rd of an inch.

Breadth. The average breadth was found to be $\frac{1}{625}$th of an inch, & ranging from the $\frac{1}{920}$th to the $\frac{1}{400}$ of an inch.

Polarised-light

Polarised light. The most prominent change when the field is darkened by the polariscope, is the blue tint which ~~is~~ ~~cannot~~ appears, & the new markings which are shewn. These latter invariably proceed from the central axial line towards the circumference, in a varying number. Sometimes they present the form of a double forked line  ; sometimes a number arise at irregular intervals from the central line  or  .

When seen at one extremity  they shew a St Andrews cross with the concentric rings very apparent.

The blue tint is generally shaded irregularly from these, & all other lines on the surface, including the circumference. It is at times superseded by yellow or both these may occur in the same granule.

The bean has always been remarkably free from all disease. only one form of abnormality, scarcely deserving the name of disease has been found. This occurs between the Spermoderm & Kernal, & affects the outer surface of the latter & the inner of the former. It consists on the Kernal of a circular, somewhat dark, space indented line, & presents an appearance as if eroded. It includes a circular area, varying from the $\frac{1}{6}$th to the 8th of an inch in diameter, having a central irregular depression from which a number of faint lines diverge towards the circumference. When scraped the Kernal is found very much softer than natural, within this space.

On the inner surface of the Spermoderm, a corresponding area is found, of a brownish colour, distinct from the usual bluish grey, & somewhat darker towards the centre.

This appearance is probably due to the attack of an insect, although we have never succeeded in finding one.

Monthly Medical Journal. Vol XX. p. 197.

Chemistry.

Professor Christison has found that the kernal contains 1·3 p.c of fixed oil along with starch, & legumin, and that no proximate principle could be obtained from the alcoholic extract, "by the more simple of the ordinary methods of analysis."

An infusion of the powdered bean in distilled water when acted on by a dilute solution of Caustic Potash & allowed to stand gave the following reaction The infusion separated into four layers; the upper being a deep or cherry red liquid; the second an orange; the third a gelatinous, semifluid substance, & the fourth the sediment of Starch apparently ~~unaffected~~ altered.

Various other reactions were obtained, but the small quantity of bean at our disposal was too limited to enable us to accomplish anything like a system of reactions.

We also attempted to discover any proximate principle, but our poverty in

respect

respect to the stock of the brand, however also formed an insurmountable obstacle.

Professor Christison has, in his paper, alluded to the difficulties in the search, which can only be met by a large supply of material, to replace the waste of repeated failures, & to enable the analyser to vary the methods of research.

Solution of the starch in distilled water yielded the usual reactions with Iodine, Bromine, & hot water.

Physiology

1. Actions of different parts of the Physostigma Venenosum.

No part of the Physostigma Venenosum is known to possess active properties, except the seed or bean.

In a trial which was made, on a rabbit, by introducing into a cellular cavity, six grains of an alcoholic extract, obtained by exhausting one ounce of dried stem, no effect was produced beyond the slight degree of uneasiness consequent on such an experiment. Four grains of a similar extract, was made into two pills with a little water, introduced into the Pharynx of a Pigeon, & observed to be swallowed, without any effect symptom being produced. (Expts: I & II Appendix.)

In other experiments have been performed with other portions of the plant, excepting the seed. It is at the same time popularly believed among the natives of Calabar that the whole plant is poisonous.

2. Actions of

2. Actions of the Sem of the Physostigma Venenosum.

a. Of the Spermoderm.

When a considerable quantity of the alcoholic extract of the Spermoderm is introduced into a cavity, with the Cellular texture of a rabbit, the animal after the first few struggles, shews symptoms of uneasiness, by restless & disturbed manner. In five or six minutes urine is voided in a copious stream; paralysis commences in the extremities, the posterior generally yielding in the first place; & in a few minutes, the animal ceases to struggle when lifted by the Ears. Tetanus soon after passed & this symptom persists during the effects of the administration; the faeces being at first nearly normal, but gradually become softer, & ultimately nearly fluid. In about twenty minutes from the commencement of the administration, the pupils are observed to be Contracted, not however to any extreme degree & always remaining under the influence of light. About the same time the muscles of the neck become affected, & the head ap-

pears

pears to be supported with difficulty. It has a trembling motion, & soon after lays on the table, resting on the chin. The whole body is at the same time ~~relaxed~~ extensible & rests on the thorax & abdomen.

Urine & faeces are frequently voided; & in about thirty minutes, the respiration becomes ~~noisy~~ noisy. Soon after, the animal reverses its position & stands for a very short time in a shaky manner, when it suddenly falls, & this process is repeated until the paralysis is completely reversed from; generally in about two or three hours.

Consciousness is retained during the whole time. The animal can hear, & is sensible to impressions, as pain those which cause pain.

Reflex action is impaired, but never completely lost.

Faeces & Urine are very frequently passed for about twelve hours after the recovery from the Paralysis.

The paralysis is one of the most striking symptoms

symptoms; it was most distinctly shown by the inability of the limbs to support the body & in the shaking of the head from incomplete paralysis of the muscles of the neck.

Fatal results have not been produced in any experiment, although doses of the alcoholic extract, varying from gr ¼ to IV. have been administered. Each grain of this extract is equal to sixteen of the powdered Spermoderm & it follows that the alcoholic extract from sixty-four grains of powdered Spermoderm, did not produce death.

The Spermoderm has evidently an action on the Spinal cord of a Sedative nature; as was seen by the mesenteric paralysis & the contraction of the Pupils. On the relation of this latter symptom & the effects of agents on the Spinal cord, I shall have occasion to write more fully when ~~speaking~~ treating of the actions of the Renal.

A Specific action appears to be exerted on the secretions of the Intestinal canal & Kidneys. It is very doubtful if the Cathartic & Diuretic actions can be referred to any

any stimulation of the muscular coats of the bladder or Intestines, because it is opposed to the general result on the muscular System, which is never excitation, & we may explain the passage of feces, as well as the escape of Urine, without involving this agency, by referring them to the natural reflex action excited by the an increase in the contents of the intestines, & the production of that degree of fulness in the bladder which usually precedes evacuation.

In one experiment also I emptied the bladder & still this Symptom was produced

The most prominent actions of the Spermoderms are therefore Sedative on the Spinal Cord, Hydragogue Cathartic, & Diuretic.

3- Actions of the Normal.

3. Actions of the Konal.

A. on Vegetables.

The infusion of powdered kunal appears to produce no bad effects on certain plants, while on others it exerts a sedative action. No explanation can be advanced of this variety of effect. Expts: XLVII. & XLIX.

This infusion serves as a liquid for the generation of Infusoria with as great rapidity as one of chopped hay.
(See Experiments XLIX.)

B. Animals. 1. Constitutional.

When a small fatal dose of the kunal is administered to one of the lower animals, a train of symptoms is produced in the following usual order.

A slight tremor is first seen, especially in the posterior regions, & extending upwards to the anterior extremities, & the head. The limbs immediately after yield; the posterior becoming usually first paralysed, & the animal lies extended on the thorax & Abdomen, in a

State

state of almost complete muscular flaccidity. A few attempts may be made to recover the normal posture, but they are usually ineffectual. Fæces are in some cases passed. The pupils contract. Respirations become slow & irregular, as the symptoms advance, with a distinct stertor accompanying both inspiration & expiration, & frothy mucus escapes from the mouth. A few muscular twitches occur, especially in the extremities. Reflex action cannot be produced by either pinching or pricking the skin. By & by, the lyelids do not contract when touched, or even when the eyeball is pricked. On lifting up the eyelids, the limbs depend in a loose manner, & the ~~occasional~~ only sign of life is an occasional gasping inspiration, which also soon ceases, & the animal appears dead.

Consciousness is preserved during the whole time until the power of expression is lost. During incomplete paralysis proofs of sensation may be obtained by pinching the ears or pricking the skin.

Immediately

1X Inart:- The Diaphragm & muscles of the extremities may be made to contract by pinching the Phrenic & Sciatic nerves, & the Contractility of the muscles generally is retained for some time after death - Sth Sept.

Immediately after death, the Pupils dilate.

On opening the body the various muscles which are not contract. The Heart is found acting regularly & the Intestines exhibit very marked Vermicular action. The heart may continue to contract for one hour & a half. Its Chambers usually cease to retain a definite order: the left auricle first loosing its contractility, then the right & left Ventricles, & after an interval the right auricle.

The large Veins in the Thorax are found distended.

The surface of the brain is injected & dark. The Spinal Cord appears normal, as to its supply of blood.

The Lungs are congested, in two experiments to such an extent as that detached portions sank in water. (Expts. VII. & XII.)

The kidneys & liver are dark, & their vessels appear full of venous blood.

The Back of the Tongue is injected, & the fauces contain frothy mucous which covers the top of the Larynx, but is seldom found within the Trachea or Oesophagus.

Brown

Serous fluid is found in the Abdomen to a greater or less extent.

The Stomach is generally full, & no change can be detected in the mucous membrane of the digestive tract.

When a large, fatal dose of the Cicuta is administered, the bulbs almost instantly yield & the animal falls. It lies flaccid, & in any posture on the table, & only exhibits muscular action by a few twitches.

The Pupils Contract. In a few cases fluid escapes from the nose. The Lachrymal secretion is increased.

Reflex motion cannot be produced by irritation, & the respirations, after a few gasps, cease.

The Pupils dilate immediately after death.

On opening the body a very few muscular twitches occur, much less strong & numerous than when a large dose is given. The heart is found distended & passive

passive, irritation however producing contractions for about ten minutes. The vermicular action of the Intestines is very much diminished & can scarcely be discovered.

Pricking of the Phrenic & Sciatic nerves produces no muscular contraction.

The Mesenteric arteries & Veins may be easily distinguished by the colour of their contents. The same difference is evident in the Aorta & Vena Cavae, & the vessels are well filled.

The Brain & Cord are unexpectedly of abnormal appearance, but had their vessels full without any injection.

On incising the Heart's chambers they are found full, & the contents of each distinctly different in colour. (Except XIX., XXI., XXXV., &c)

The Stomach & Intestines are usually full & the Bladder distended.

The Liver, Lungs, & other organs appear quite normal.

These effects were produced whatever the Channel of introduction into the system.

I have

I have made Experiments in which the introduction took place through the medium of each of the principal tissues & systems in the body.

By means of the Circulatory: by direct injection & application to a wounded surface, &
(Expts XIX &c)

By means of the Nervous System: by immediate contact with nerve substance.
(Expts XXIII. & XXVI).

By means of the Respiratory system: as by injection into the tissue of the Lung.
(Expts: XX, XXI, & XXII.)

By means of the Nutritive system: by introduction into the Stomach & Rectum.
(Expts: XII to XVIII)

By means of the Muscular tissues: by direct contact (Expts XXIV, & XXV.)

By means of the Serous tissues: into the cavities of the Pleura, Pericardium, & Peritoneum. (Expts: IX. X, & XI).

By means of the Mucous tissues: as by contact with the Schneiderian membrane, the Auditory mucous membrane, & the Conjunctiva.

(Expts XXXIII. & XXIV.)
The effects in each case only varied in their rapidity, & a connection apparently exists between this rapidity & the class of symptoms produced. Direct injection produces the most rapid results, then introduction into cellular & serous tissues, & lastly contact with the mucous tissues.

I have never succeeded in producing any symptoms by application to a surface denuded of cuticle in the Rabbit (Expt. XXX.)

2 Topical action of the Remedy.

When the alcoholic extract is placed in contact with living contractile tissues, it exerts a powerful action in suspending their property of contraction.

When a muscle is dissected, & carefully painted over with a small quantity of the syrupy extract, in a very short time it loses all power to contract when irritated

situated, either directly or through the medium of its nervous supply. (Expt XXV.)

The Cardiac muscle may be so affected, by removal from the body & injecting the syrupy extract into one of its chambers (Expt: XXVII)

When the Exterior is painted over a temporary Effect is only produced, & the contractions cease after an interval (Expt: XXVIII).

The vermicular action of the Intestines is almost instaneously stopped in a limited portion, by the painting over of that portion with a little of the syrupy Extract. (Expt XXIX). A similar result follows the injection of an infusion by the Rectum. (Expt XV.)

The same topical effect is produced on the Eye, by direct application, as through the System. Contraction of the Pupil with some degree of immobility, confined to the Eye on which the preparation is applied, being very soon produced. (Expt XXIV).

A local inflammatory action is produced where the preparation has been in contact with several

several of the tissues — a distinct congestion being apparent on an examination after death. (Expt 1 & 11) This was only seen when the preparation had been in contact with cellular & serous textures, never in the case of a mucous membrane. It appears to be an example of the general phenomenon, of a foreign body, producing a local inflammation, & not of any specific irritant action of the poison.

When the syrupy extract was applied to the cutis of worms, a very rapid action ensued. A little mucus was evidenced by wriggling. This was quickly followed by inability to progress, & abnormal retraction when the worm was irritated. Soon after, if his motion had not contracted, then mucus is exuded & death occurs. (Expt XXXI - a)

When a limited portion, as one half, is carefully painted over with this extract, the paralysis & other symptoms are, for some time, confined to that portion, whether anterior or posterior. (Expt XXXI b. & c)

The heart of the Physostigma Venenosum acts with the greatest energy on Birds.

When a moderate fatal dose is given retching & vomiting are produced, the respirations become hurried, feces are occasionally passed, tremors occur in the limbs & the bird falls. A few convulsive efforts, in one case distinct opisthotonos, ensued, these gradually pass into slight muscular tremors & then all movement ceases. (Expts: XVI. & XVII.)

The pupils are contracted.

When a pretty large dose is administered, the bird immediately falls down, & is almost instantaneously dead, without any evident symptoms. (Expt: XVII.)

On opening the chest in the more slow cases, the heart is found contracting, & may continue to do so spontaneously for upwards of Eighteen minutes. (Expt: XVI.) The cavities contain a dark blood; the large veins of the chest & Abdomen are engorged with venous blood, & the lungs are dark in colour.

In the more rapid cases the heart is

is found perfectly quiet & does not contract on irritation. The cavities are full of blood, the contents of the right being dark & of the left florid. (Expt. XVII.)

The Physiological actions of the bean were produced on Rabbits, Cats, Dogs, Birds, Frogs, Lizards, Turtles, Fish, Leeches & Worms, & several genera of the Mollusca.

De Functionibus Nervorum Cerebralium et Nervi Sympathici. p.p. 109, 114. 1839.

Generalization.

From these results, & especially from the two varieties of action, & appearances after death, it appears that the Calabar bean exerts its influence primarily on the Spinal Cord, & that its action is one of Depression. Along with this, there are various Special actions, as the paralysis of the Heart & the Contraction of the Pupils.

The Paralysis of the Heart is apparently an action wholly separable from that which the bean invariably exerts on Muscular fibre, & which is the bean on local application to muscular tissue.

The contraction of the Pupils is probably of considerable importance in illustrating the action of the bean.

Valentin has from a series of Experiments on the ganglionic system of nerves, & especially on the mixed ganglia of the neck, arrived at the conclusion that the Iris receives its nervous supply from two sources — from Cerebral & from Spinal nerves. He has also shown that the Cerebral filaments are supplied

supplied to the Circular muscle or Contractor of the Pupil; & the Spinal to the radiating fibres of the Iris, or dilator of the Pupil.

It follows from this that the Condition of the Iris, & consequently of the Pupil, may be influenced by agents operating on the distributed nerves, or on their origins. Thus, a Stimulus applied to the Spinal filaments will occasion contraction of the radiating fibres & dilatation of the Pupil; and a Stimulus applied to the Cerebral fibres will cause, through the Circular fibres of the Iris, Contraction of the Pupil.

A little consideration will shew that the normal condition of the Pupil may be influenced, through the nerves supply in at least Six different methods:—

1st by Cerebral irritation.
2nd by Cerebral depression.
3rd by Spinal irritation
4th by Spinal depression.
5th by a combination of Cerebral irritation & Spinal depression
6th by Cerebral depression & Spinal irritation.

Use

1 The Pupils are generally Contracted in cases of poisoning by Opium; they have however been observed dilated. The symptoms of Cerebral irritation are very obscure, but we think that the universally admitted mental excitement which follows a dose of Opium must be regarded as an indication of such irritation. We would suggest, that where the pupil has been observed dilated an almost complete suspension of Cerebral activity had been produced with more or less perfect Spinal action.

See Christison "on Poisons". p. 709.

It has been observed that, although at the commencement the pupils may be contracted, as the Stupor increases they gradually dilate. Taylor's "Med. Jurisprudence" p. 183. 1861.

2 Christison. "A Treatise on Poisons". p. 896. 1845.

It has been observed that during the convulsive paroxysm the dilatation increases. Taylor. Op. Cit: p: 207.

British & foreign ~~Review~~ Medico Chirurg: Review. LVIII. p: 536.

In some experiments on rabbits I have distinctly observed this change in the Pupils.

3 Christison. Op: cit: p. 865.

4 Christison. Op: cit: p: 835. Taylor "on Poisons" p: 771.

5 Christison. Op: cit: p: 745. Taylor Op. cit: p: 722.

6 Christison Op: cit:, p: 951. Taylor Op. cit: p: 729.

7 Christison Op: cit:, p. 899.

8 Alex: Fleming M.D. "An Inquiry into the Physiological & Medicinal

We have arranged several of these effects, as produced by poisons, in a tabulated form, & the connection between the Physiological actions & the conditions of the Pupil is very evident.

Six Methods in which the size of the Pupile may be affected.

Two Cerebral

1st Cerebral irritation = Contraction as

1st Opium.

2nd Cerebral Depression = Dilatation. as

5th Belladonna.
3rd Althaea Cynapium.
5th Hyoscyamus Niger
6th Alcohol
7th Veratrum Album.

Two Spinal.

3rd Spinal irritation = Dilatation. as

2nd Strychnine
4th ~~Althaea Cynapium~~

4th Spinal Depression = Contraction. as

8th Aconitum Napellus
Physostigma Venenosum.

Two Combined Cerebral & Spinal.

5th Cerebral irritation & Spinal Depression = Contraction. as

9th Ruta Graveolans

Medicinal Properties of the Aconitum Napellus".
1845. p.p. 21 + 11.
Christison. op. cit. p. 869.
Christison. op. cit. p. 891.
Christison. op. cit. 861.
Christison. op. cit p. 849. Melligan Mat. Med. p. 357.
Christison. op. cit. p. 765. Taylor. op. cit. p. 653.
Christison. op. cit. p. 889.

6. Cerebral Depression & Spinal irritation = Dilatation, as

12 ℞ Hydrocyanic acid.
13 ℞ Digitalis Purpurea

11 ℞ Cicuta Virosa —
10 ℞ Nicotina.

The actions of the two nerves supplies for the Iris must be regarded as antagonistic. When, therefore, the influence of one set of fibres is removed, that of the other will be unchecked & will produce a greater degree of its proper action. Thus, when the influence of the Cerebral supply is removed from the Iris, the muscles which are acted on by the Spinal nerves will be unchecked, & dilatation of the pupils will result, in the same manner as a direct irritation of those (Spinal) nerves would act.

The actions of the bean of the Physostigma Venenosum may, in the same way, be referred to the Spinal Cord. The Contraction of the pupils may be caused in three ways, by Cerebral irritation, by Spinal Depression, or by a combination of Cerebral irritation & Spinal Depression

pression. The symptoms of its administration disprove any Cerebral irritative action, & so neither the first nor last of these can be regarded as the cause of the Contraction. The symptoms, on the other hand, distinctly indicate a depressing action on the Spinal Cord. By this action the power of the Cord to transmit impressions is destroyed, & so, necessarily, the power of transmitting the nervous influence to the Iris. The balance between the Dilator & Contractor muscles of the Pupil is thus removed, by the Nervous supply to the Dilator of the Pupil, & Radiating fibres of the Iris, being stopped, the Circular fibres act, & the pupil is Contracted.

In after experiments it was observed, that, some time after the contraction of the Pupils had commenced, if the animal was excited to muscular exertion, as in Struggling when irritated, the Pupils very distinctly dilated. Expt.

An extension of these views may be of importance in the analysis of the symptoms produced

* The late Professor Alison refers to such a complication. See "Outlines of Physiology & Pathology". p. 332. 1836.

produced by every poisonous agent, & perhaps also in the Diagnosis of Diseases of the Nervous system, as in the localised affections of the nervous system.

Death is produced in two ways, either by Asphyxia or Syncope, but from the special action of this agent on the Cardiac muscle, it is extremely probable that the results are complicated by the special weakness of the Heart's action.

The cases of death by Syncope are very characteristic. (Expts: VIII., XX., XXXV., &c)

The cases of death by Asphyxia are equally so. (Expts: V., VI., VII., X., XII., XV., XXIII., &c)

Death commenced at the Heart when large doses were administered, & at the Lungs when smaller moderate quantity was introduced into the system.

There can be little doubt that the first important symptom is paralysis. This usually commences in those muscles that are

are supplied by the lower part of the Spinal Cord, & quickly extends upwards, until the muscles of respiration are involved, & death by Asphyxia is produced.

That such an action is produced we must conclude for the following reasons.

1. The muscular paralysis occurs invariably as a first symptom in every experiment.

2. The appearances in an examination after death from small fatal doses, were those which are caused by Asphyxia. (Expts V., X., XIV., &c.)

3. The Heart was found contracting after death, with considerable regularity in the majority of cases.

4th The Pupil contracted during the Continuance of the Effects, which, I have endeavoured to shew, indicates a depressing action on the Spinal Cord.

We may also arrive at the same conclusions by disproving the connection of the symptoms & appearances of the death with the known phenomena of fatal results from other

other causes.

That the action of the poison is not primarily exerted on the Heart is very apparent in the former class of results, for 1st, it must be evident that if the paralysis were dependent on any cessation of the necessary supply of blood from a failing of the Hearts action — the vis à tergo — this symptom could not exist without marked effects being produced in other parts of the system, & more especially in the Encephalon. There is also every reason to suppose that this procession of the Cardiac action, & consequent abnormality in the supply of blood, would affect the functions of the Brain Proper, even previous to those of the Spinal Cord. But neither Convulsions nor Coma, have been observed in any Experiment.

2nd After moderate, & even in pretty large, doses the Heart has been found Contracting at a rate of from 50 to 60 beats in a minute in rabbits (Expts. V., VI., VII., &c) This diminished action cannot be regarded as

Treatise on Cruosote. 1836.

Monthly Med: Journal Vol XX. 1855.

as a cause of the final insensibility, as it is well known that a much greater diminution may take place, with scarcely any symptom.

3d It has been shown by various Investigators, as Dr Cormack, that where death is caused by a narcotic poison paralysing the action of the heart, the respiratory movements may continue a short time after the Cardiac Paralysis.

We may exclude any primary influence originating in the Encephalon by the complete absence of any symptom which could be referred to the Brain.

We therefore conclude that in certain Cases this agent produces death by Asphyxia.

It also occasions death, when large doses are given, by the symptoms of Syncope, as has been proved by the investigation of Professor Christison.

This

1/ "Exp: Sur le principe de la vie" 1812.
2/ Inquiry into the Laws of the Vital Functions.

This investigation shewed that in large doses the symptoms were languor, muscular flaccidity, & the cessation of respiration, with the preservation as far as could be judged of sensation & consciousness. The heart was found after death completely paralysed, & the right & left chambers contained blood of different colours.

These symptoms & phenomena were also observed in my experiments, & conclusively prove that death is sometimes produced by Syncope.

If the deductions & conclusions we have made in reference to a Spinal action of the brain be allowed, & if the absence of mental phenomena have the import we have ascribed to it, it appears probable that this Syncope is in reality caused by a rapid & energetic action of the brain on the Spinal Cord.

It has been shewn by the experiments of Legallois & Dr Philip Nixon that when an agent acts on the Spinal Cord in

in a partial & somewhat slow manner, it may destroy the function of the cord, without influencing, or, at least, without directly paralysing the action of the Heart. On the other hand, if this action be intensified, general muscular paralysis is immediately produced, & the contractility of the Heart is almost instantly destroyed.

In the former case, the symptoms arise in the Spinal Cord, & death is produced by Asphyxia; in the latter, the symptoms also begin in the Cord, but death is produced by Syncope.

The two varieties of symptoms produced by the Gem may be harmonized in the same way. It

It exerts a special influence on the Spinal Cord: when this is limited in extent & energy the only marked effect is Paralysis, & death is caused by Asphyxia; when this spinal action is more extensive & energetic, the Heart is affected, its contractions cease, & death occurs by Syncope.

We

We may, therefore, conclude that the Renal of the Seed of the Physostigma Venenosum

1. Acts on the Spinal Cord, by destroying its power of conducting impressions.
2. That this destruction may result in two well marked & distinct Effects.
   a. In muscular paralysis, extending gradually to the Respiratory apparatus, & producing death by Asphyxia.
   b. In rapid Paralysis of the Heart, probably due to an extension of this action to the Sympathetic System, thus causing death by Syncope.
3. A difference in dose accompanies this differential effect.
4. The action does not extend to the Brain Proper, pari passu with the action on the Spinal Cord. The functions of the brain may however be influenced secondarily.
5. It also produces paralysis of muscular fibre — Striped & non-Striped.
6. It acts as an excitant of the Secretory System, increasing more especially the

action

action of the alimentary mucous membranes.

Topical effects follow the local application of the ~~[illegible]~~ watery solution & alcoholic extract of the Kousal.

These are

1. Destruction of the Contractility of Muscular fibre.
2. Contraction of the Pupil when applied to the Eye-ball.

Smallest

Smallest fatal Dose. This varies in different animals. I have found that four grains of the powdered kernal may be swallowed by an eight months rabbit without fatal results. (Expt XIII.)

Five & a half grains is the smallest dose with which I have caused death in a rabbit of this age (Expt. XIV.)

Modified Actions.

A general impression is said to prevail among the natives of Calabar that the varying Effects of the bean is dependant on some mode of preparation by the "fetish-men". I have found that prolonged boiling of the powdered kernal in water does not to any evident degree modify the energy of the poison. (Expt XXXV.)

It is however probable, from one Experiment which I performed, that subjecting the entire bean to the action of boiling water for several hours may modify its action. It appears from

from this experiment, that a dose of the Kunal so prepared, twice as great as will usually produce death, occasioned a train of symptoms very nearly resembling those which have been ascribed to the Spermoderm, but produced no fatal Effect. The most characteristic of these symptoms was a violent Cathartic action. The poison may thus be eliminated from the System even when no vomiting was produced, & à fortiori when this physiological action has resulted. The active principle of the Spermoderm appears to be absorbed by the Kunal, & to exert its influence on the system before a fatal action can be produced by the Kunal.

This also coincides with the statements of the various Calabar Missionaries who state that the Bean is prescribed Entire at the Trial thus considerably diminishing the Chances of any tampering by mixing with other Substances, & in no way opposing the previous subjection of the

Entire Cran to such a process - (Expt XXXVI)

The peculiar action of the Kernal on the Medulla Spinalis appeared to be so directly antagonistic to that of Strychnine that it seemed desirable to discover whether the effects of the one poison may not be made to annul those of the other. For this purpose a poisonous dose of Strychnine was given to a full grown rabbit & when its action had been decidedly produced, a poisonous dose of the syrupy extract of the Kernal was injected into the posterior flank. Almost immediately after the Spasmodic Condition of the muscles of the Posterior Extremities was removed the convulsive spasms of the hind limbs disappeared, & they became perfectly flaccid. At the same time rigidity & violent spasms alternated in the anterior

anterior extremities & anterior portions of the trunk.

The animal died shortly after (Expt. XXXVII.). It seems extremely probable that no bad consequences would result from a Compound dose of Strychnine & this Animal could the exact Quantities be discovered, which would in each pro duce the same degree of these special actions. This is certainly a very great difficulty to overcome, but it does not appear to be insurmountable.

a. Constitutional

Action on Man.

Our knowledge of the action of the bean on man is still in an unsatisfactory condition. The complete series of symptoms cannot be described with any degree of certainty, as no fatal case has been observed by persons qualified to describe the effects. This is certainly unsatisfactory; in as much as it implies a limit in the occurrence of fatal cases, none having taken place beyond the country where the bean is employed as an Ordeal; but it is unsatisfactory when we confine ourselves to the scientific aspect of the question & consider the great blank which is thus caused in the details of the Effects on man.

At the same time we may arrive at some conception of these results, by considering the accounts of the symptoms in Trial by Ordeal, & the effects of small quantities on man, & comparing these with the conclusions arrived at by Experiments on the lower animals.

I. Symptoms of Trial by Ordeal.

The symptoms in fatal cases as described by un-

unprofessional witnesses may be arranged in the following sequence.

No sensation is experienced for about ten minutes after the commencement of the trial. At this time the victim is said to become thirsty. This symptom gradually increases until the ~~victim~~ accused loses command of his Indian Stoicism to such an extent, as to struggle violently, & entreat the bystanders for water. From whom his wishes are satisfied no diminution in the thirst occurs; the sensation increases &, according to one writer, this increase is due to the water drunk.

Soon after the power of swallowing is lost; foam escapes from the mouth, convulsions & twitches are observed in the muscles of various parts of the body, but especially in the back; & then death, generally about thirty minutes from the commencement of the trial.

During the whole time of the ordeal the victim retains complete consciousness, as shown by the absence of delirium, & the acute appositeness of the remarks which are made,

made. H

The power of Speech is retained till a short time before death, & long after the accused is unable to swallow.

The most distressing symptom in fatal cases is the sensation of intense & insatiable thirst. So great is the Agony, that the accused have frequently known to entreat the bystanders to put an end to their torments at once. "Kill me — kill me — "Kpen wut mi" + (in) time, one, but not 2, bad-thing. "+ in Kiet, di wanke idiok-nkpo". Are the words of one poor Woman, suffering the agonies of thirst, & after the power of deglutition was lost. It is doubtful if this is really a symptom caused by the "Esere nut", or simply the result of exposure to the burning heat of an Equatorial Sun; for, as already mentioned, the trial generally commences in the fore noon. In no case which has come under my notice, in which any of the physiological actions were produced, has the slightest trace

D

* The portions which were taken are described as being about the size of a pea. This I have found is probably equivalent to about grs v of the Army Normal.

of this symptom I have experienced.

In cases in which the ordeal is successfully undergone, nausea is produced, & is quickly followed by vomiting, when the accused is immediately discharged in no Court. The sickness rapidly disappears, & headache is the only symptom which remains during the remainder of the day.

2. Small doses on Man.

Professor Christison has accomplished the feat of eating the largest quantity of the Kernal, without fatal results. This was about twelve grains.

Cases occurred in Glasgow where two Servant girls eat each about ~~six~~ five grains, which was accidentally put within their reach, & perfectly aware of the properties of this treat. I have also taken portions, varying from six to ~~eight~~ nine grains, & have administered small doses of an alcoholic tincture to various persons.

From these data the effects of a small dose may

may be described as follows:—

In about five minutes after the administration a peculiar feeling is experienced in the Epigastrium immediately below the Sternum. This is very slight at first but gradually increases in intensity till it becomes almost painful. Emetation occurs in a short time & always takes place during the occurrence of this Epigastric sensation. This continues at intervals for a considerable time, & is bye & bye complicated by a feeling of dyspnoea. Dizziness is soon after experienced & in short time a certain powerlessness in the muscles of the extremities.

If a somewhat larger dose be taken as in Dr Christison's experiment twitchings occur in the Pectoral muscles, & the dizziness is much augmented.

I have also experienced a dimness of vision; a supposed increase in the Salivary secretion, or at least an accumulation of fluid in the mouth whatever its source; & a marked, though slight, perspiration. At this stage attempts to walk

walk or even to move the limbs are difficult, & may even be unsuccessful, while at the same time Consciousness is perfectly retained.

These symptoms reach a certain stage, & then gradually decline, dizziness being generally the most persistent, & they almost entirely disappear at the conclusion of a night's rest.

The Heart's action is described in professor Christison's case as becoming irregular & tumultuous. The same irregularity has been observed in some of the cases which have come under my notice, & in many the contractions have continued to diminish in number as was indicated by the radial pulse. In one Experiment six grains of the powdered kernal reduced the pulse twenty beats in half one hour & a half. (Expt. II. det: outlaw.)

These results agree, as far as they go, with the conclusions from experiments on the lower animals.

The most remarkable symptom is the muscular paralysis, both of the voluntary muscles of

of the Heart. It is well known that important differences may exist in the actions of agents on different animals, as to the details of symptoms, & as to the prominence which is given to one or more of these. This is well seen in the present instance, where the Physiological action on the muscular tissue, & especially on the Cardiac muscle is, from the facilities of observation, shown with great distinctness. This action certainly indicates a powerful sedative property of the drug which is probably in the first instance confined to the Spinal Cord its nerves, & the absence of delirium, & the unaffected Consciousness support this view of a local action.

In the symptoms of trial by ordeal, the whole details & especially the Convulsions accompanied by perfect consciousness, appear to favour the view of death by Asphyxia rather than a slowly advancing Syncope. It would however, be extremely unphilosophical to theorize & speculate any further on this subject. We must await

await a complete account of symptoms & appearances after death, from the observation of fatal cases. We have only learnt that no effect has been described which appears to oppose the conclusions from an experimental investigation on the lower animals.

The Epigastric sensation is not referred to by Professor Christison. In every case in which I have myself taken any of the powdered kernal or its preparations, & in every case in which it was administered therapeutically this was one of the first symptoms. It is possible that the speedy emetic may have originated or prevented this symptom in Dr Christison's experiment.

The sensation itself is rather peculiar & resembles the unpleasant feeling which is produced when a piece of solid food of too large size is suddenly "bolted". It is at first very slight, & comes at intervals, generally commencing about fifteen minutes after the administration. It is soon accompanied by

Eructations

fractations, which generally occur during the sensation, being preceded & followed by it. In no case it was produced by the external application of the tincture. It is very probably due to an action on the Sympathetic System.

General muscular weakness has in each of the experiments been mentioned as a prominent symptom. It is very difficult to discover the immediate cause of this action; whether it be due to a change in the inherent property of muscular fibre, or on the nerves which convey the impressions which act as the direct stimulants of these fibres. The latter view appears to be the more probable, because we have found that the voluntary ~~muscles~~ nerves are distinctly removed from the influence of the Will, & that, too, in an order the reverse of that in which an agency could be brought in contact with these muscles by the blood, as the paralysis of the lower preceding ~~the~~ is that of the upper extremities. We have also

also seem that the function of the nerves to conduct impressions may be lost (Expt. XXVI.), while the muscles to which these nerves are distributed, retain their contractility, & respond to direct irritation. And we have seen, that when the extract was applied to the external surface of the heart, its effect was slow & transitory, whereas when it was brought in contact with the inner surface an immediate & permanent effect was produced, thereby proving that the greater opportunity to influence the nervous structure is followed by the greater effect.

The Digitalis action on the Heart may be explained in two ways; first by a direct & local action of the agent on the proper contractile apparatus, whether nerve or muscle, & secondly, by a nervous influence emanating from the Cord — a result of the change produced there by the Poison.

We are inclined to suppose that both these methods may have their share in producing this action. As we have seen that

that an energetic influence is exerted on the Cord, & even on the Spinal nerves, which are considerably removed from this organ, & are entitled to suppose that this Special Nervous influence may affect the Spinal supply of the Heart. It is also probable that the smallest portions which may be circulating in the blood, will exert this Relative action on the nerves distributed on the inner surface of the Heart.

That this latter is not the primary, but an additional action we are inclined to believe from the very significant fact that the muscular paralysis has been observed before any perceptible change in the radial pulsations. Expt: III Appendix Actions nil

b. Topical

When the extract is applied to the Eyeball it immediately causes a copious secretion of tears, & in about five minutes a distinct Contraction of the pupil

confirmed

Confined to the side of the application, and myosis.

In about ~~that~~ (30) minutes after the application the Pupil becomes a mere speck, but still retains a certain degree of mobility, & Continues in this State for twelve or fourteen hours.

A slight headache & dimness of vision in the affected side, are almost always produced, but these only continue for one or two hours at the Commencement. (Expt V. "Actions outlaw").

When the extract is applied to the Edges & outer surface of the eyelids there is, in addition to the contracted Pupil, a degree of immobility in the eyelids (Expt. VI.)

No effect was produced on the pupil by friction with any preparation of the Dermal, on the temple or over the Eyebrows.

When either the tincture, or extract, is applied to the Skin, a local action is caused Especially if a certain degree of rubbing has been employed. In about half an hour

half-an-hour a distinct diminution in the sensibility occurs, & soon after the part may be pricked with very little pain being caused. (Expt. VIII.)

This action is unaccompanied by any irritation of the skin; the mode of application & the nature of the preparation being sufficient to account for the slight degree of redness produced.

Preparations.

The powdered kernel may be exhausted by Spirits of Wine, both of Proof & Rectified strength.

Water & acetic acid have not been satisfactorily shown to dissolve any of the active principles. A few trials were made with both, & the results were that preparations could not be obtained by either by percolation, & that the infusion, by maceration with water, responded

suspended such variable quantities of the starchy & leguminous constituents as to be quite unfit for any experimental purpose.

Rectified Spirits has been usually employed as the menstruum in the therapeutic portion of this investigation, & a tincture of known strength uniformly employed.

The following is the formula for its preparation:— Kinal, in the form of moderately fine powder. ℥i.

Rectified Spirits f℥iv.

Place the kinal & ℥i of the Spirits in a carefully covered vessel & allow to remain for forty eight hours. Then pack in a percolator pour in what Spirit may be left in the vessel, & add the remaining ℥i of Spirits. When this has ceased to escape from the percolator, pass as much more Spirit through as may be required to obtain ℥iv of a golden yellow tincture. This preparation is so far objectionable as the kinal is not completely exhausted by the Spirits used, but it seems preferable to one obtained by reducing to a certain standard, by distillation, a tincture

obtained

obtained with a much larger proportion of Spirits.

There found five minims of this tincture a good dose with which to commence the administration. This appears to possess the activity of about four grains of the kernal, as far as can be judged by the effects produced. The dose may be increased to double this amount without pushing the physiological action to any extreme.

The kernal can only be exhausted by employing a much larger proportion of Spirits. By using twelve ounces of rectified Spirits with one ounce of powdered kernal, distilling off about Eight ounces, & evaporating the remainder — first to a syrupy consistence in a water bath & then by spontaneous evaporation — twenty-one grains of an extract of considerable consistence may be obtained, or 3.75 per cent.

This extract has a deep brown colour, & a peculiar Treacly & disagreeable odour for which I can find no comparison.

Its actions are in no way different from

from those of the Kernal & Tuniture.

Therapeutics.

We are entitled to infer that the important Physiological actions of the Fluid of the Physostigma Venenosum may be employed with the greatest advantage in the treatment of disease.

Its special action on the Spinal cord would lead us to suppose that it may be a valuable agent in combating all those conditions of the hyperæsthesia, which may be referred to this portion of the Nervous System.

The result of the experiment with Strychnine & this substance seem to indicate that it may be of some service in all hyperæsthetic conditions of the Cord.

In Tetanus, whether Traumatic or Idiopathic, the morbidly excited condition of Spinal system may be corrected

In Epilepsy, the investigations of Schroeder van der Kolk, have so far discovered the Pathological changes that accompany this Disease, that we would be even more sanguine of good results from its employment in this Nervous affection

The

The Sedative action on the Heart will also very probably prove of service in certain diseases We have found this action of value in Erysipelas, Delirium Tremens, Ephemeral Fever & Bronchitis.

The abnormally excited condition of the Hearts action has been invariably modified, & especially in Delirium Tremens, the disease cut short by the free administration of the Tincture.

Five minims usually produces a certain effect on the Circulation, but in almost every case this dose has been considerably increased, before a permanent & decided effect could be caused.

We have been entirely guided by the condition of the pulse in these affections; a pulse in any wise feeble being considered a decided Contraindication, while one strong, rapid, & hard was considered a true indication for the employment of this Tincture.

Case I

Case I. Erysipelas.

Nov. 15th 1861.

Walter S. aet 38. Married.

Out door labourer.

Patient was attacked four days previously with rigors, but continued his work till yesterday morning.

When first seen at 10 A.M. Pulse = 96. full & hard. Whole face, & especially right side, red & puffy. Upper Eye-lids much swollen, & inflammation extended to Scalp, Nose & neck. Tongue, with slight fur. Throat & fauces red & tender.

Patient has been restless, & had very little sleep for two previous nights, & was slightly delirious last night.

℞

Inist. Physostigmae min: v.
Aquae fontanae ℥j.
M.

Statim sumendus.

A little flour was also ordered to be dusted over the inflamed parts.

8. P.M. p = 94. Attendant states that the

the restlessness has diminished.

℞

Infus: Physostigmae min: vij.
Aquae fontanae ℥j.
m.

Statim sumendus.

Nov. 16th.

10 Am. Pulse = 90. Still full & hard. Patient slept for a short time during the night. a little delirium.

Inflammation has not extended, & appears rather diminished in the face.

℞ Infus: Physostigmae min. viij.
Aquae fontanae ℥j. m.

Statim sumendus.

5 P.M. Pulse = 86. Slept for two hours this afternoon. Bowels freely opened. Inflammation is decidedly less.

Repetatur. Statim sumendus.

Nov. 17.

10 AM. Pulse = 78; soft & a little irregular. Slept well during night. No delirium. Desquamation commenced in face.

Repetatur. Statim sumendus.

8 P.M.

8 P. M. Pulse = 64; soft, irregular & intermitting. Patient has slept during the day. Natural features recognisable. Fullness of fauces gone.

On being asked Patient described a sensation with Stigmatism as of a ball rolling about & followed by Fluctuation. This has been perceived half an hour after the two last Doses.

Repetatur Statim Sumendus.

Nov. 18.

6 A.M. Pulse = 62; soft, irregular, & intermitting. Inflammation almost gone, a little puffiness still near the Ears.

Patient says he feels quite well, but is unable to stand from loss of power in the legs & thighs, & says he observes his arms look & almost powerless.

℞ Mistura Phyport: min V.
Aquæ fontanæ ℥i. m.
Statim Sumendus.

8 P. M. Patient has been most of the day. Pulse = ~~68~~ 65; soft, irregular & intermitting. Complains of extreme weakness.

Puffiness

Puffiness, almost entirely disappeared in neighbourhood of Eyes, & Respiration commencing there.
Mebienia Stopped.
Remarks. The Pulse gradually rose to 70, & became much Stronger in afew days.
Weakness disappeared in two days.

Case II. Delirium Tremens.
Wm S.- Aet 36. Labourer, employed at the Caledonian Distillery. Robust & plethoric.
Accustomed to take considerable quantities of Spirits, Ceased, & had no food for two days.
December 2nd. 1861.
8. P.M. Found patient with pulse, 90, full & hard, tongue, trembling when protruded, moist & with slight fur.
Symptoms had begun two days previously, last night the patient had no Sleep, & was so Delirious as to get out of bed frequently notwithstanding the Care of his wife & a male relative.
℞ Tinct: Physostigmae min VIIIj.
Aquae fontanae ℥j. m.
Statim Sumendus.

Dec: 28

Dec: 28. 9 A.M. Pulse, 84, irregular, but comparatively hard & full. Patient had a little sleep last night, & was quiet & without delirium all night. Haleat Min: XIJ. Stetrim.

5 P.M. Pulse, 76 soft & irregular.

Patient had slept two hours after last dose. Delirium quite gone. Bowels have been freely opened.

Repeater.

Dec: 29.

10 A.M. Pulse, 68. soft & intermitting.

Patient slept all night, & woke appar ently quite well. All the symptoms have disappeared. Weakness of limbs complained of when attempts made to walk.

Medicine Stopped. Patient was soon in perfect health.

Remarks. We should recommend this Tincture only in such cases as the above; never in weak patients, or when the pulse is feeble at the commencement.

All the symptoms in Delirium Tremens may be referred to the Brain & Heart. The most prominent

prominent symptom, &, in the present condition of Pathology, the first indication for treatment, is the persistent Sleeplessness.

Sleep may be said to consist of a cessation of mental activity accompanied by a diminution in the Circulatory force. It is probable that the Circulatory condition is dependent on that of the whole body, & especially of the Nervous system & Brain; a diminution in the demand for blood being followed by a diminution in the supply.

In this Class of cases therefore we may explain the action of this agent by its influence on the Heart action. The arterial Cardiac action is reduced, & whatever be the condition of the Circulatory Vis a fronte, or demand for blood, the vis a tergo, or principal agent in supplying this demand, being brought under control, the disposition to wakefulness is conquered from the large supply of blood, necessary for fast Cerebral action, being prevented.

The morbid mental activity is thus removed & a condition favourable for the accomplishment of Sleep produced.

Case III.

Case III. Febricula.

Ann McG. aet. 29. Unmarried.
Factory Girl.

February 9th 1862.

10 A.M. Patient complained last night of Coldness & Shivering, General lassitude, & pains in back. This morning she felt so unwell that she could not leave her bed.

Her pulse, 126; strong & hard. Tongue dry. General surface dry & hot. Patient Complains of thirst.

℞

Mist: Phosphatis min: vj.
Aquae fontanae ℥j. m.
Statim sumendus.

3 P.M. Pulse 123; other symptoms the same. Habitat Mistura, m: x

8 P.M. p = 86. Bowels have lately been opened. Tongue a little moist. Skin soft, with slight perspiration.

Repetatur.

February 10.

10 A.M. Pulse, 78. Patient perspired freely during

during the night. Headache & pains nearly gone.

Habeat Mistuae, min: xiij. Statim.

8 P.M. Pulse 72. Copious perspiration.

Repetatur

February 11th

10 A.M. Pulse 74; irregular & of normal force. Tongue nearly clean. Surface moist. Repetatur.

8 P.M. Pulse, 68. soft & irregular.

Bowels have Compressed.

Habeat Mistuae min: X. Statim.

February 12th

6 a.m. Pulse, 61; feeble & irregular. Patient slept extremely well. Tongue clean & moist. General surface moist. Patient says she feels well.

Habeat Mist: min: vj. Statim.

8 P.M. Pulse 63; soft, irregular, & intermittent. Patient has cramps, & Complains of General muscular weakness. Bowels have Compressed.

Medicine stopped.

Feby: 13.

10 a.m.

10 A.M. Patient appears quite well.
Pulse, 70. Still complains of weakness when attempts are made to move limbs.
Remarks. No further treatment was required - Pulse rose to about 72, but Continued weak & irregular for several days. The muscular weakness disappeared entirely in three days.
The Epigastric sensation was observed in this Case also.

Case IV. Acute Bronchitis.
Evan M. aet: 40. Married.
Stent & Wheat.
March 2nd 1862.
8 P.M. Has been unwell for three days.
Pulse, 110; full & strong.
Respirations, 37. Frequent cough, & expectoration of considerable quantities of frothy mucus. Tongue dry & loaded.
Dermal surface, dry & hot.
Thirst great, & severe headache.

Typical

Physical Sgns. Percussion, normal. Large & small crepitation over the left lung, especially towards the apex. Rhonchus in right side.

℞ Inhal: Physostigmae min: viij.
Aquae fontanae ℥j m.
Statim sumendus.

March 3rd.

10 A.M. Pulse 90, rather softer, still hard. Respirations 34. Bowels have been twice moved since 9 O'Clock last night & stools wet. Patient vomited about two hours after taking this dose, & this was followed by copious perspiration.
Tongue, cleaner, still loaded.
Dorsal surface moist.
Habeat Inhalat: min: vj. Statim.

8 P.M. Pulse 96. Respirations, 34.
Bowels have been once moved since last visit. Patient speaks spontaneously of sensation of muscular weakness; and, on being questioned, admits having the epigastric sensation & inclination, which commence about ten minutes after each dose & continue for about half an hour. Habeat min: X.

March 4th

March 4th.

6 A.M. Pulse, 84; very soft & compressible. Respirations, 28. Had no sickness or vomiting. Bowels have been opened once since last visit. Headache, quite gone. Cough much relieved.

Rhonchus cannot be heard on right side; no change in left lung.

Repetatur mix: X.

8 P.M. pulse, 72; soft & irregular. Respirations 28. Surface, moist. Tongue, moist & nearly clean. Bowels have not been opened. Appetite, much improved. Patient again speaks of the evacuation.

Repetatur, mix: X.

March 5th

10 A.M. Pulse 70. Respirations 30.

The small expiration is confined to the left ~~lung~~ apex; the large extends over the left side.

Repetatur. mix: X.

8 P.M. Pulse 66, very soft & intermittent. Respirations, 27. Tongue, moist & quite clean. General surface very moist, indeed wet

Wet. Patient is very much opposed to having the medicine stopped, as she thinks it is of much advantage to her.

Habeat min: viij.

March 6th

10 Am. Pulse, 68; soft & irregular. Respirations 25. All feverish symptoms have completely disappeared. Tongue pur fectly clean. Physical signs in lungs have very much diminished, a limited amount of crepitation being heard in left Apex. Muscular prostration very great.

Medicine stopped.

Remarks. This case terminated in complete recovery in about four days more, without any further treatment. The muscular weakness has disappeared in that time.

From the fatal nature of this disease, & the marked effects of the treatment, we cannot avoid concluding that the Tincture of Physostigma was of great service in producing the favorable result.

Cathartic Action. We have seen that a decided

decided action was exerted on the Bowels in some of these cases, & this is inconformity with the results obtained by experiments on the lower animals. It is possible that this action may be found of some service, but we have not as yet specially tested this property. If it can be so employed, we think it will prove of peculiar value from the absence of any nauseous taste, & from this Cathartic action being produced without any tenesmus.

The Anaesthetic action may be applied to the treatment of all nervous irritations. I have employed it with great advantage in various Neuralgic affections and in irritable Stomach.

It probably acts by producing a local change in the nerves of the affected region, which interferes with their power of receiving or Conducting impressions — a local anaesthetic action. That it does not depend on any constitutional action of the kind appears probable from the absence of any appreciable

appreciable constitutional symptom. Constitutional effects have been produced by the local application, when the dose given was large, but anaesthetic action has been produced without any such effect, not even the Epigastric sensation. This is also supported by the unequivocal local action on the Iris.

An agent can remove painful sensations in only three methods; 1st by influence exerted on the tissues which cause the pain by their abnormal connection with the sensitive nerve — as in the swelling of inflammation; 2nd, by an influence exerted on the organ which receives the impressions — the Cerebrum; & 3rd, by an influence exerted on the conducting nerve fibre.

We have no facts to support the first cause of the Sedative action in the present case, & it is extremely improbable. The second is disproved by the absence of Cerebral symptoms; & every probability exists in favour of the last.

I have employed both the Tincture of the alcoholic

alcoholic extract; the former is the more preferable form of application. ℥ss ℥j of the mixture, rubbed on the affected region for fifteen minutes, will remove severe pain for at least two hours, & a cure will be produced by repeating the application for a limited number of times.

The following Case will illustrate this action.

Case V.

J. S. aet 38. Married.

Labourer & Maltsman.

March 5th 1862.

Affected with severe pain in the Lumbar region, aggravated by movements. Pain commenced suddenly on the 1st of March while Patient was working. It was then intermittent, but so severe during the attack as to permit him from working. The pain has become much worse during the last two days; it is now constant though with paroxysms of severity, & has compelled Patient to leave his work & remain in bed. He says he has had no sleep for two nights.

When

When seen patient was lying on his back & appeared frightened to make the slightest movement. The pain was confined to the lumbar region, & was most severe on the right side.

Half a drachm of the Mixture of Physostigma was ordered to be rubbed in the painful region for fifteen minutes.

March 6th

10 AM. Patient is considerably better. Can move a little, & slept last night. Patient says the pain was completely removed about half an hour after the application, but returned in three hours, though in a much milder form.

The same quantity was ordered to be rubbed in immediately, & this repeated at 7 o'clock in the evening.

8 P.M. Patient out of bed & sitting before the fire. Without the slightest pain & extremely happy.

The application was repeated once, & in the following day patient returned to his work. In this case the Epigastric Sensation

sensation was produced by the external application.

I have employed this mixture as an Anodyne in various other Neuralgic affections & even in frontal Hemicrania, with marked relief. A slight degree of smarting is produced during the application, & a little redness generally remains, but this seems entirely dependent on the alcohol of the mixture.

The following case illustrates the sedative action on the Stomach.

Case VI. Irritable Stomach.

Isabella Mc. aet. 19. Servant.

Been unwell for a few days with loss of appetite and a feeling of oppression in the Abdomen.

November 5th, 1861.

9 P.M. Today immediately after breakfast patient had severe vomiting, & this was repeated after very moderate meals at dinner & tea. Vomited matters consisted of almost unchanged food.

Pulse, 70. Tongue, moist with a little

Err

pro. Complains of great nausea.

℞, Liet: Physostigmae min vij.

Aquae fontanae ℥j. m.

Statim sumendus.

November 6th

10 A.M. Pulse, 66; feeble & compressible. Nausea still complained of, but a little breakfast was retained. Patient experienced the epigastric sensation & sensation.

Repetatur.

4 P.M. Pulse, 60, soft, compressible & irregular. Patient had a good appetite at 2 P.M. & took & retained nearly her usual dinner. Nausea entirely gone. Complains of inability to work from weakness in upper & lower extremities.

Medicine Stopped.

Sickness & Vomiting did not recur, & the weakness very soon disappeared.

Hypnotic Action.

The Physostigma may in certain cases act as a hypnotic, though we have no proof of its possessing any special or primary

primary action in producing Sleep. Its action as an Anodyne, may account for the Sleep in nearly all the cases which this was produced. The previous want of Sleep was due to the irritation of the pain, & by removing such irritation the patient was permitted to sleep. This was well seen in case V.

It is possible also that the Sedative action on the Heart may exert a direct influence in causing Sleep, by producing that moderated activity of the Circulation which invariably precedes & accompanys Sleep. In this way we may explain the Sleep produced in Cases I. & II.

In all these cases the action has been to remove mechanical obstacles to the assumption of Sleep; whether it can produce the same effect in a natural & healthy condition of the System is a matter of doubt. In Professor Christisons experiment Sleep was produced two hours after the dose had been taken, although this Sleep was of a most imperfect character the mind being active all the while, that

note to be inserted -

that" Dr Christison "was not conscious of having been asleep." In no experiment which I performed on myself did I observe the slightest tendency to drowsiness.

A topical action which may prove of some service is the influence exerted on the Pupils. The power which Physostigma possesses in contracting the Pupil is very great. (See Expt. F.)

In Mydriasis, whether dependent on the over action of Belladonna, or as a symptom of Amaurosis, especially the Hydrocephalic variety, this agent at least deserves a trial. The local application is followed by no inflammatory symptoms & should thus be preferred to the usual stimulating applications which are generally ~~usually~~ employed to produce this result. We would recommend the alcoholic Extract for this purpose.

The only other application which I shall refer to is

is the treatment of various parasitic affections of the skin. This action has not been really tested by me, but I can bear testimony to the great efficacy of the Extract in killing the numbers of one species of these animals. The infusion of the Kunalis commonly employed by the Natives of Calabar for the purpose of removing various parasitic animals, & especially lice, from the persons. I obtained, through the kindness of a Dispensary patient some very large specimens of the Pediculus Capitis, & found that they were killed in five or six minutes after a small quantity of the Extract had been brought in contact with them. The infusion of the Kunal is said to be invariably successful with the natives of Calabar.

Toxicology.

Toxicology.

We are glad to say that this department of our investigation is as yet almost untouched. The only case which can be referred to is one which has been already mentioned as having occurred in Glasgow to two Servant Girls.

They each eat, through curiosity about five grains of the Animal. The symptoms which followed have been kindly narrated by Dr Maclagan, in one of these cases. The woman "Chewed & swallowed a piece about the size of a green pea. "A very few minutes thereafter she felt "sickish & had the feeling as if a ball "were coming up to her throat. She "went out to the Street on an Errand, "felt stupid & giddy as she walked "along, with a sensation of great feebleness "over the whole body rendering progression "a matter of difficulty. She did not "vomit, but about an hour afterwards, "being recommended to swallow a "quantity of hot water, vomiting came on

Pretty

"pretty freely. She went to bed &
"slept tolerably, but next morning
"& for two days afterwards she felt
"feeble & out of sorts."

This case is interesting in so far as it gives an unbiased account of the symptoms produced by a moderate quantity of the drug. The emetic which was administered had probably no effect in diminishing the action of the five or six grains which were taken, as it was not given for more than an hour afterwards.

Coffee is peculiarly useful in getting rid of the languor & headache which are produced when somewhat large doses are taken. This was experienced by Professor Christison & my own ~~experience~~ observation was invariably in support of Dr Christison's statement.

Thomas R Fraser.

Appendix.

A. Experiments on the lower animals, & Vegetables.

1. With the Stem of the Physostigma Venenosum.

Experiment I. On a Rabbit.

I obtained about three ounces of the Stem from Professor Balfour, which was a part of a considerable quantity which had been sent from Calabar by the Rev. Mr Thomson. This was treated with ℥xij of Methylated Spirits, & an Extract obtained by Distillation & Evaporation, which was found to weigh grs xviij.

Six grains of this Extract was mixed with half a Drachm of distilled Water & introduced into a Cellular cavity in the right flank of a female rabbit, eight months old. The rabbit was carefully watched for two hours, without any Symptom being observed. It was again observed three hours after the introduction & no effect could be perceived, & again at the end of six hours with the same negative results. The rabbit was all this time naturally lively, fed with usual

usual habit.

Experiment II. On a Pigeon.

Four grains of the Extract from the Stem was made into two small balls with a little distilled water, introduced into the Pharynx of a full grown Pigeon, + observed to be swallowed. The bird was watched for two hours without any apparent effect being produced. Four hours afterwards the Pidgeon continued lively + apparently unaffected.

2. With the Bean of the Physostigma Venenosum

a. Of the Spermoderm.

Experiment III. On a Rabbit; buck, 12 months old.

One grain of the Alcoholic Extract was suspended in 3ij of distilled Water, + injected with a Wood's Hypodermic Syringe into the cellular tissue in the left lumbar region

region. A few struggles occurred during the injection.
In half a minute, the animal became
restless.
In four & a half minutes, urine was voided
in a very copious stream. Can jump
about & is active.
In six minutes, fell down & remained.
In ten minutes; forced urine passed. Mouth
& jaws moved as in chewing.
In 23 minutes; Pupils contracted. Can
support itself on the fore legs, but not on
hind, but cannot retain this position
long.
In 26 minutes; struggles a little when lifted
by the ears. Reflex movement & sensation
diminished.
In 32 minutes, rather wet faeces passed;
Can sit up on haunches, head shaking.
Muscular paralysis well seen in the difficulty in maintaining this position, one or
other side often yielding the rabbit frequently
on the point of falling on its side.
In 40 minutes; Pupils contracted; Very wet
faeces are frequently passed, & urine is
occasionally

occassionally voided. Respirations are noisy.
In one hour; Continues to fall & recover a
~~mi~~ ~~mest~~ normal position; posterior extremities
being obviously the weaker. Reflex action
a little diminished. Contraction of Pupils
increased.
In two hours; Extremely wet, almost fluid
faeces continue to be passed, as well as urine.
Paralysis diminishing; Rabbit can stand
for a short time on both fore & hind limbs.
In two hours & a half; Jumps about.
Wet faeces & urine still passed in large
quantity.
In three hours; paralysis completely gone;
Pupils nearly natural. Faeces & urine
still voided at frequent intervals.
In four hours; Urine no longer voided
a small quantity of much drier faeces
very occasionally passed.
In five hours; All the symptoms have
disappeared. Animal appears
quite recovered.

Experiment IV.

Experiment IV. Rabbit 6 months old.

Four grains of the alcoholic extract from the spermoderm, suspended in one drachm of distilled water, was injected into the Abdominal cavity of a rabbit.

A few struggles during the introduction were followed by quiet, & again in a very short time by signs of uneasiness.

In four minutes. Urine was passed, & no signs of paralysis.

In twelve minutes Fell, both extremities suddenly yielding, posterior had however been shaky for some time previously.

In fifteen minutes. Feces passed. Ears acting as in Chewing

In Eighteen minutes. Head was shaking. Respirations limited. Eye-lids do not contract when irritated. Pupils very small, dilate when animal is carried to a dark closet.

In twenty minutes Respirations noisy. When the hands are suddenly clapped animal starts. Pricking of the skin is followed by struggles & evident symptoms of pain. Very wet faeces are frequently passed & the urine is also occasionally voided.

&c

in thirty minutes. The muscular flaccidity ~~was~~ complete, reflex action may, however, be excited by irritation of the skin. Urine continue to be passed; former being very acid.

These symptoms continued for several hours & then disappeared. The rabbit was quite well next morning.

Other experiments were performed, but these are sufficient to illustrate the action of the Spermoderm.

6. Of the Kernel.

Constitutional introduction by,

1. Cellular tissue.

(Of a rabbit).

Experiment V.

A subcutaneous cavity was formed in the right flank of a full grown White rabbit, & 6grs of powdered Kernal, made into an emulsion with 3ss of distilled water, was ~~was~~ removed into it.

No change

No change was produced for four minutes. When the posterior extremities began to drag, when the rabbit moved. In another minute, they were Completely paralysed, & almost immediately after the anterior extremities gave way, & the rabbit lay stretched on its Abdomen & Thorax. Voices were now passed, & a tremor commenced in the muscles of the neck.

In eight minutes, the rabbit was lifted by the ears & did not struggle in the slightest degree, while the extremities hung down in a loose & flaccid manner. It remained on its side or in almost any position in which it was arranged.

In twelve minutes; a few unsuccessfull efforts were made to recover the normal position. The Pupils are distinctly Contracted. Muscular twitches succeed each other on the whole body, but especially from the lower Extremities, along the trunk, to the neck. Respirations noisy, & very irregular. Respirations is sometimes accompanied with a general Convulsive movement of the whole body.

In fourteen minutes, the Pupils are extremely contracted

dilated & immobile. The Eye lids do not contract when irritated or even when the Eye ball is pricked with the Scalpel. Respiratory movements can scarcely be distinguished. Irritation of the Skin does not produce any reflex movement. Reflex Spasmodic contractions occur in the muscles of the Thorax & Abdomen.

Within sixteen minutes, respiration had entirely ceased.

Autopsy immediate.

The Heart was contracting about 60 per minute in regular & rythmical manner.

These contractions continued with perfect regularity for fifteen minutes, the number then decreased till in twenty minutes after death the contractions were 40 p. m. In thirty minutes the proper rythm was lost, & in the order already described, & in forty minutes the right auricle ceased its action. Irritation with the point of a Scalpel could produce contractions for fifteen minutes longer, or fifty five minutes after the death, & seventy-one minutes after the administration.

The Large Veins with the Thorax were distended.

Ventricular

1/ Insert:- Spinal Cord presents no abnormal appearance.

2/ Insert:— Rigor Mortis was commencing one hour after death.

Vermicular movements were very distinct in the
Intestines. Lungs & Liver Congested.
1, Surface of the Brain injected with dark blood.
Irritation of the Phrenic & Sciatic nerves
produced a little contraction in the Diaphragm & muscles of the Thigh.
Kidneys slightly congested. Veins of the
Abdomen distended & full of dark blood.
On incising the Heart the right Chambers were
found to contain dark uncoagulated blood;
in the left chambers a small quantity of
blood of the same Colour was seen.
Frothy fluid was found in the Pharynx
& top of Larynx. A very little was also
found within the Larynx, but none in
either the Trachea or Oesophagus.
The entire digestive tract was examined,
but nothing abnormal was seen. The
2, Stomach was full & the lower portion of
the Intestines was empty for a considerable
distance from the Rectum.

Experiment VI. (Of a Guinea-Pig).
A small portion of the Skin in the right thigh
of a

of a full grown Guinea pig was pinched up with a pair of forceps & the sharp nozzle of a Woods hypodermic Syringe inserted into the subcutaneous Cellular tissue. Ten minims of a syrupy alcoholic Extract was then injected. No distress seemed to be occasioned. In two minutes faeces escaped, & shortly after, the animal seems unable to walk. In six minutes the animal fell on its right side. Its normal position was almost immediately recovered, & again lost. This was repeated several times till it became extended at length on abdomen & thorax, in ten minutes. In twelve minutes the head was shaking, tremulous movements occurred in both extremities, & the respirations became hurried & with a very little stertor. The Pupils were Contracted & mobile, & light was not lost. Smell & Sense of hearing were tested & appeared unaffected. In twenty minutes, fluid was observed running from the nose, the lachrymal secretion was much increased, & the eye ball & lids were bathed in a milky white fluid. A large quantity of glairy fluid was

was escaping from the mouth in a continuous stream.

In twenty-five minutes the animal remained in any position which was physically possible. Respirations were apparently accompanied with an effort, & were very noisy.
A strong effort was made to reestablish itself on its legs, but unsuccessfully.
In thirty minutes the evidence of retained sensibility not so distinct, & a very severe irritation is required to produce reflex action. The respirations were very laborred & noisy, & accompanied by movements in the sternum. Eyelids did not contract on irritation.
In thirty five minutes, the respirations could scarcely be distinguished, & in thirty six they had entirely ceased.

Autopsy - immediate.

Heart was contracting regularly - 80 per min: & continued to do so for twenty minutes after the body was opened. The contractility of the Heart was retained for other forty minutes, proper precautions having been taken to keep its

Surface

surface moist.

The Brain was injected with dark blood, & the vessels of the various Cerebral Plexuses were extremely full & black. The Spinal Cord appeared normal. The Veins of the Orbit were full of blood.

The muscles which were cut contracted in an imperfect manner. Slight contractions were produced by irritation of the Phrenic & Sciatic nerves. Vermicular action distinct in the Intestines.

Vessels of the Thorax & abdomen distended with dark blood. Incision of the Heart allowed black blood to escape from all the Chambers, a very little from left side. Dark blood was contained in the Carotids.

The remaining appearances were the usual results of death by Asphyxia, & very similar to what have been described in the previous Experiment.

Experiment VII. (Rabbit)

Seven grains of finely powdered Kurmal seed made into an Emulsion with one drachm of distilled

distilled water, & caused miasprec in the subcutaneous cellular tissue, of the left flank of a full grown rabbit.

A few struggles occured during the introduction, but only lasted for a few seconds, after which the rabbit became quite quiet. The first indication of my effect was when the animal stretched itself on the table, about four minutes after the introduction, by extending the anterior extremities forwards & the posterior backwards. Immediately afterwards a number of successive twitches occured in the extremities, & the rabbit remained without resistance on its side. The muscular twitches extended to the neck, causing irregular movements of the head. In six minutes the Respirations became noisy, & evidently laboured, the inspirations being accompanied by movements of the extremities & trunk. The Pupils are contracted, but mobile & reflex contract on irritation. Sudden noise produces a distinct ~~shock~~ start.

In twelve minutes the pupils are very contracted about the 1/6th of an inch. Respirations laboured & very

very noisy. Frequent, but slight muscular spasms occur. Glairy fluid escaped from the mouth & also from the Eyes.

In fifteen minutes, the eyelids do not contract when the Eye ball is irritated. The Pupils have become more specks. Reflex action can be produced by very slight degree of irritation of the Sphincter. Respirations occur at intervals of considerable length; muscular spasms continue, & appear to accompany the inspirations. In sixteen minutes Respiration has almost entirely ceased, & had certainly done so in seventeen.

Autopsy - immediate.

Heart contracting with regularity, 70 per minute. This spontaneous contraction continued for twenty-five minutes, gradually however diminishing in strength & number. Contraction could be renewed by gentle pricking for ~~five~~ seventy minutes.

Brain & other organs presented the appearances already described; with the exception of the Lungs which were peculiarly engorged, presenting the appearance of Pneumonic Condensation in the anterior

anterior portion of the inferior left lobe & nearly the whole of a small middle lobe, & these portions were found to have a greater Specific Gravity than Water. Abbody fluid could be squeezed out. The back of the tongue was also injected. All the veins were distended in the Thorax & Abdomen. Very little muscular irritation could be produced by either direct stimulation or through the nerves.

The right side of the Heart was distended with venous blood; the left was comparatively empty, but contained blood of a dark hue.

Experiment VIII (Cat.) with forceps

The skin was raised in the left flank of a large black & white female cat, weighing five pounds, & in very good condition.

The ~~sharp angle of~~ needle point of a Wood's hypodermic Syringe was inserted into the subcutaneous Cellular tissue & ten minims of asympty extract injected.

In two minutes trembling occurred, & in three minutes the Cat fell. Fluid seeped from

from the mouth; the Pupils contracted; & Urine was voided.

In five minutes the Respiration became hurried, Laboured, & noisy. Reflex action could not be excited by severe Stimulation. Eyelids did not contract when the Eyeball is irritated. The animal is now perfectly flaccid & the only signs of life are occasional gasping inspirations. These cease entirely within seven minutes.

Autopsy. Immediate.

The Pupil is observed to dilate. Very few Contractions occur in the cut muscles.

The Heart is perfectly quiet, without the slightest action. No contractions could be produced by irritation of the Phrenic & Sciatic nerves.

Intestines & Stomach full, but no vermicular action could be observed though carefully looked for.

The Brain was perfectly natural, the vessels were all full without engorgement. No peculiarity could be found in the Spinal Cord.

On removing the Pericardium, nothing abnormal

Fluids

minutes second in the Heart, & a limited contract
wn Could be produced by irritation with a
Scalpel, fifteen minutes after death.
The vessels of the Thorax & abdomen were
well filled, & could be readily distinguished
by the Colour of their contents.
On incising the left ventricle, blood of the
usual arterial hue escaped, & on doing
the same to the right side, dark blood
issued out. Both were allowed to issue
side by side, & the contrast was distinctly
shewn.
The Lungs, Liver, & Spleen, & Kidneys were normal.
No change could be perceived in the Mucous
Coat of the Intestines. The Gall bladder
was full.
The region of injection was found to
be limited to the subcutaneous Cellular
tissue. It was of a red Colour, & the charac-
teristic odour of the Extract was easily per-
ceived.

2. Serous Cavity.

Experiment IX. (Of a rabbit)

Five minims of Syrupy extract of the Kenaleaves
injected

injected by Wood's hypodermic syringe, into the Peritoneum of a buck rabbit, five months old.

Unsteadiness was produced in one minute, especially of the posterior extremities, which are very soon dragged powerless behind the normal, when progression is attempted. The anterior extremities become completely paralyzed in three minutes. The pupils are contracted. The Respirations are noisy & frothy escapes from the mouth. Reflex excitability is completely lost in four minutes; six four & a half minutes all respiratory movement has ceased.

Autopsy — immediate.

Heart passive; contractions excited by irritation & continue for several minutes.

Brain, natural. Spinal cord apparently healthy. Incision of the Heart permits blood to escape from both sides of normal & characteristic tone. The Arterial & Venous Systems generally normal & their vessels full with perhaps a little distension of the Veins of Thorax.

Stomach

Stomach & Intestines full. Bladder dilated. Other organs normal.

Nervous irritation produced a slight contraction in the Diaphragm & muscles of the thigh. Pupils are again dilated.

No inflammatory changes could be detected in the Peritoneum. The odour of the extract was very evident.

Experiment X. (Rabbit).

The Abdominal wall in a young rabbit of six months, was cut through & the Peritoneum exposed.

Four minims of Syrupy Extract was injected into the Sac of the Peritoneum. The Respirations were 72, immediately before this Operation.

In one minute the Respirations were 80. The animal becomes unsteady in two minutes. The pupils are very small & eye lids contract. Fluid escapes from the mouth. The respirations become laboured & noisy & in four minutes are only 30 per minute. The animal immediately after falls, a few kicks occur

occur, & in five minutes it ceases to remain on its side. Objects which are brought close to the eye produce a change in the position of the head, & a start is produced by a sudden sound.

In six minutes, the eyelids will not contract on irritation from the eye-ball. After muscular twitches, involving at once the muscles of the extremities, abdomen thorax & neck, succeed each other at intervals. These are accompanied by full gasps, which gradually become weaker & cease entirely in 3 or 4 minutes.

Autopsy, immediate.

The cut muscles contract. The Heart is acting regularly; 78 per minute. This diminishes gradually, but the spontaneous contraction of the right auricle did not cease until one hour & six minutes after death, & the contractility, as produced by physical impressions did not cease till thirty minutes later. The Vessels of the Thorax & Abdomen are distended. Vermicular action is well marked in the Small Intestine.

The Bladder

The Bladder, Stomach & Gall-bladder are distended. The Brain is injected with dark blood: the vessels at the base of the Cerebellum & on the sides of the Medulla Oblongata are full of venous blood.

The lungs are dark & congested in various situations, & a sanguinolent fluid could be pressed from them. They float in water.

The right Chambers of the Heart are distended with black blood & a small quantity of the same colour was also found in the left side.

No inflammatory change could be detected on the Surface of the Peritoneum.

A frothy fluid was found in the finest upper portion of the Larynx.

Experiment XI. (Of a Kitten)

Two minims of the Syrupy Extract was injected into the left Pleura of a kitten nine weeks old. Almost immediately after signs of weakness were exhibited. The respirations became noisy & hurried, & in one minute the animal fell down.

The Pupils

The Pupils rapidly contracted, & in three minutes the eye lids were not affected by irritation.
The respirations became very feeble & infrequent, & accompanied with muscular twitches over the whole body. In three and a half minutes they had entirely ceased.
Autopsy immediate.
The Pupils became dilated, before the cavity of the chest could be exposed.
The Heart was passive & evidently distended. Irritation could excite contractions for eleven minutes.
Pinching of the Phrenic & Sciatic nerves produced no contractions of their supplied muscles.
Vermicular action of the intestines very feeble.
Brain contained no unusual amount of blood. The Spinal Cord was slightly red with a few injected spots. The Stomach was empty; & the intestines contained a considerable quantity of properly digested food. The bladder was distended.
The Lungs & Organs generally, normal.
Blood was normally different in the two sides of the Heart, as well as in the arterial & venous systems.
The region of injection was confined to the Pleural Cavity

Cavity, had a red tinge, & distinct odour of the Extract.

3. Into the Digestive system.

Experiment XII. (of a dog.)

Two (2) grains of the Extract, prepared as mentioned in page [1], was mixed with a little bread crumb & formed into a very small pill. This was placed in the back of the Pharynx of a full grown, strong & well fed English Terrier, & was observed to be swallowed. No effect was produced for Nine minutes, when fluid escaped from the mouth. Tongue was protruded & Lapping. Eructations were heard; and the Gait became unsteady. In twelve minutes paralysis was decided in the posterior extremities, & the respirations became hurried. Vomiting of a mucous looking substance, the passage of soft faeces, & a copious ejection of Urine occurred nearly simultaneously, in Seventeen minutes. The animal soon after fell on its haunches, & in a short time the

the anterior extremities became paralysed & the dog lay extended on its abdomen & thorax. When called by name the head was turned. Common sensation was unaffected, as also sight. The Pupils were equally contracted in twenty five minutes.

General muscular twitches occurred about this time. In thirty six minutes vomiting again occurred of a mucous, & somewhat biliary looking substance, without any food. This appeared to give some relief, as the animal rose up immediately after, but, after standing on his legs for a few seconds in a very unsteady manner, again fell down.

Vomiting again occurred in forty minutes, & was followed by an effort to regain the use of the legs. This was unsuccessful & showed a great increase in the muscular paralysis. The respiratory movements became feeble & were attended with a loud stertor in forty-three minutes. The dog remained in any position in which was placed. Muscular spasms became frequent. Urine was voided, & feces - extremely wet -, passed. The head was still turned when the

the dog was named, & distinct quickness of pain followed slight irritation.
In forty six minutes the animal appeared perfectly flaccid, & respiratory movements were merely distant gasps. In forty eight minutes the ~~Right~~ Eye-Lids did not contract on irritation of the Eye-Ball & in fifty minutes all respiratory movements had ceased.

Autopsy. immediate.
Cut muscles contracted vigorously.
The Heart was found acting regularly, 86 per minute. It retained its Spontaneous action for other seventeen minutes, & contractions could be excited for forty minutes after death.
The vessels of the Throat were distended with black blood & this was distinctly perceptible in the Aorta.
The Peristaltic action of the Intestines was very evident & could be seen for ten minutes.
The Brain were injected with dark vessels, the Spinal surface was covered with vessels containing black blood, & a quantity of serous fluid

fluid escaped when it was exposed. No change was detected in the Medulla Oblongata or Spinalis.

The Lungs were dark & congested in various situations. They floated in water, but when one particularly engorged portion, about one inch square was cut away, it was found to sink in water.

The liver Kidneys & Spleen were very much engorged.

No change could be detected in the mucous tract of the digestive System. The Stomach was empty, & the large intestines, a considerable distance above the Rectum, contained nothing. Frothy mucous was found in the Pharynx & Larynx.

Irritation of the Phrenic & Sciatic nerves produced Contractions in the Diaphragm & muscles of the Thigh.

Experiment XIII. (of a Rabbit).

Four grains of Kurral, very finely powdered, was made into a pill with a few drops of water & inserted into the back of the mouth of, & swallowed by, a buck rabbit of eight months.

No

No effect was produced for ten minutes, when distinct symptoms of paralysis were observed in the posterior extremities, & in twelve minutes the rabbit lay stretched on Abdomen & Thorax. This position was recovered from in thirteen minutes, but the animal could not walk from the paralyzed condition of the posterior extremities, which were dragged behind when attempts were made. Reflex action & sensation appeared unaffected at this time, & violent struggles were made when the rabbit was lifted by the ears, with less violence of the posterior movements.

These symptoms gradually diminished; in twenty-two minutes he could stand up with accustomed degree of steadiness & struggled much more violently when held up by the ears. Faeces were passed in twenty-five minutes, & this was repeated at frequent intervals until seventy-five minutes, the faeces becoming each time softer until almost fluid. The pupils were a very little contracted. No effect on the reflex function or sensation. No muscular

paralysis

paralysis was completely recovered from in one hour & twenty minutes, & the other symptoms disappeared about twice before.

On the following day the rabbit appeared quite better.

Remarks. This experiment was undertaken with the view of determining the smallest fatal dose in a rabbit. It shows that four grains of the Kunal introduced into the digestive system did not produce death.

This experiment was repeated with five grains on a rabbit of the same ages, & listen to this one. Death was not caused, only an aggravation of the symptoms have described. The muscular prostration was especially more marked, the Respirations became very laboured & noisy, & the effects were considerably prolonged.

Experiment XIV. (of a rabbit).

Five & a half grains of the fine powder of the Kunal was made into pills, & swallowed by a buck rabbit of eight months. (Bought of the one in Sept XIII).

A slight

A slight degree of paralysis was seen in the posterior extremities, in ten minutes, & soon after they altogether yielded, the anterior portion of the trunk being supported by the fore limbs. The fore legs also yielded in fifteen minutes & forces were passed about the same time. The Respirations became noisy in twenty minutes, & wet forces were again passed.

Reflex action was ineffectual at this time. The pupils contracted, & in thirty minutes the rabbit submitted to remain in any position.

In thirty five minutes the respirations became extremely noisy & accompanied with muscular spasm. Forces & urine were passed & reflex action could not be procured by penetrating the skin. General but slight muscular spasms now occurred frequently, the Eye-lids did not contract when Eye ball was pricked, & the respiratory sphincter ceased. In forty minutes, a general & weak spasmodic contraction of the muscles occurred, & in forty-one minutes the Respiratory movement had stopped.

Autopsy

Autopsy immediate.
The cut muscles contracted. The Heart was acting, 72 per minute. & did not cease till thirteen minutes after death.
The Vermicular action of the Intestines was well marked.
The Brain was rather darker than usual, & no change could be perceived in the Spinal Cord.
The Cerebro Spinal fluid was somewhat abnormal. Serous fluid was also found of abnormal quantity in the Abdomen.
The large veins were distended. The right Chambers of the Heart were engorged with black blood; the left Ventricle was empty, but a little black blood was seen in the left auricle.
All the Viscera contained an abnormal amount of black blood, & of dark colour.
The muscular System was extremely flaccid. Contractions could be caused by irritation of the nerves.
Remark. ∴ Five & a half grains can cause death, in a Rabbit of Eight months.

Experiment

Experiment XV (of a rabbit).

Ten grains of a very fine powder of the kernel was suspended in two drachms of distilled water & injected into the Rectum of a full grown rabbit. (The faeces in the Rectum had been first moved by pressure).

The first symptom which was observed was a contraction of the Pupils in about (first) five minutes. About the same time the Rabbit appeared languid, & in ten minutes fell on Abdomen & Thorax, & immediately afterwards vomited in any position. In twelve minutes, the Eye-ball was touched without closure of the Eyelid, & no sign of pain followed severe pricking of trunk or extremities. Fluid escaped from the mouth the respirations became very noisy, laboured & accompanied by kicking of legs & movements of the head & trunk. The Respirations gradually became weaker & weaker & ceased entirely in twenty minutes.

Autopsy. Immediate.

The Heart was found contracting; 52 per minute. This action gradually diminished

Spontaneous Contraction ceased in the right auricle in ~~Some~~ fourteen minutes. In five minutes the Contractions were 66; in 10, 15; & in 12, 4. Irritation could produce Contraction for one hour longer, or seventy-four minutes after death.

Vermicular movements were observed in the Intestines, only at the upper portion.

Brain & Organs were engorged with venous blood.

Both Chambers of the Heart contained black blood. Back of Tongue & fauces very red.

Experiment XVI. (of a Sparrow)

A small quantity of Sympathetic Extract — sufficient to cover the extremum point of a pen knife — was placed on the back of the tongue of a Sparrow. The bird was immediately set free, & allowed to fly about a room. In two minutes it had alights, & movements were observed in the mouth of a gasping character. With this exception nothing was observed abnormal till fifteen minutes when a gelatinous looking substance was vomited up. The legs also

also failed at the same time, & after flying about for a short time the bird fell on the right side. & in twenty minutes the respirations were very irregular & accompanied with spasmodic contractions in the wings & legs. One such of rather greater severity than usual occurred in twenty minutes after which no respiratory movements took place

Autopsy Immediate.

The Heart was contracting 90 per minute, & did not cease for Eighteen minutes. Its Cavities contained black blood. The veins of the Throat & Abdomen were injected.

Experiment XVII (of a Sparrow).

About twice the quantity of extract that was employed in Expt: XVI was applied to the Tongue of a Sparrow. The bird was then liberated, & flew away. The power to use its wings was evidently diminished in one minute, & in two, ineffectual attempts were made to fly. The respirations became hurried, & in four minutes, the bird fell on its side & vomited.

a

slight muscular spasm, or rather a feeble tremor, occurred & in four & a half minutes respiration had entirely ceased.

Autopsy. Immediate.

The Heart had ceased to contract, & no action could be produced by irritation with the point of a Scalpel. Its Chambers were distended & contain blood of normally different colours.

No contraction could be produced by irritation of the Phrenic & Sciatic nerves.

Experiments XVI & XVII. were repeated with the same results as detailed. except that in XVI a, Opisthotonos occurred.

Experiment XVIII. (of a Sea Gull

Five minims of Tincture of Physostigma mixed with an drachm of distilled water was poured into the throat of a full grown Sea Gull.

No effect was produced for four minutes when in rapid succession the bird shook, subsided on thorax & Abdomen, fell on its side, & the respirations, after

after

a few irregular gasps ceased in four & a half minutes.

Autopsy Immediate.

The Heart contracted very feebly & slowly for two (2) minutes. Irritation could produce a slight action for twenty minutes ~~after~~ or twenty two after death.

The hearts Chambers contained blood normaly diffrent in Colour. The right side & the large Veins were distended.

4. Circulatory System.

Experiment XIX. (of a Rabbit.)

Five minims of asympy extract was injected into the left Femoral Vein, in a direction from the Heart - Centripetaly - of a full grown doe Rabbit.

It almost instantly fell, & remained Quite motionless with the exception of a few twitches with the posterior extremities.

Eyelids were not closed on irritation & reflex action could not be excited in ~~forty two~~ thirty thirty seconds

The results obtained under this section were those of introduction through avariety of ~~tubes~~ Channels.

Excepting one experiment, the method followed was first to puncture the thoracic walls & pleura with the needle point of Wood's Syringe & through this inject a Sympathetic extract. In this way, however, a passage was formed for the poison to enter the system ~~primarily~~ not only through the Respiratory System but also the Circulatory. ~~to the through~~

seconds. Respiration ceased in forty two seconds.

Autopsy: Immediate.

Heart distended & Passive. Colour of Contained blood normal.

Vermicular action cannot be discovered in the Intestines.

5. Respiratory system

Experiment XX. (of a Rabbit.)

Five minims of Syrupy extract was injected into the right Thorax of a young rabbit 4 months old — with Woodis Hypodermic Syringe. This was done in such away as that the Pleura would be penetrated & the pulmonary structure reached.

The rabbit was perfectly quiet & apparently undisturbed for one minute & fifteen seconds when it stumbled in endeavouring to jump away. In one minute & a half the fore legs yielded & the animal fell on Thorax; almost immediately after the back legs gave way &

& the Rabbit lay extended in a flaccid con-
dition. The Pupils contracted. A few kicks
occurred with hind limbs. Irritation of the
eyelid or eye-ball did not produce closure of
the eye. General muscular quivering
accompanied & could scarcely be distin-
guished from the Respiratory movements,
& these ceased in two or three minutes
after the administration.

Autopsy. Immediate.

The Heart was passive, distended &
contained blood of normal colours.
Vermicular action very slight.
Slight contractions followed pinching
of the Phrenic & Sciatic nerves.
The organs & Viscera normal.

Experiment XXI. (Of a Rabbit.)

The Trachea of a full grown Rabbit was ex-
posed & cut open, a short way above the Sternum.
Five minims of the Syrupy Extract was allowed
to run down the Trachea towards the Lungs, by
gently in a gentle stream from the needle point of
a Woods Hypodermic Syringe. As soon as the

Rabbit

Rabbit was liberated it ran a few steps, then stumbled, & in forty two seconds, fell down.

The Pupils contracted, irritation of the Eye ball did not produce winking, a few gasps & slight muscular tremors occurred, & in two minutes all Respiratory movment had ceased.

Autopsy. Immediate.

The Heart was passive, irritation could produce a slight, wavy, muscular action - not contraction - for ten minutes. When incised, black blood was found in the right side, & Scarlet in the left.

No inflammatory action was discovered in the Trachea & Bronchi, but a distinct odour of the Extract could be discovered over a great portion of both Lungs.

The Vermicular action of the Intestines was extremely indistinct. The Stomach & Bladder were distended. The Arterial & Venous systems appeared normal. The Vessels were filled without distension.

Experiment XXII. (of a Crow).

Four minims of the Tympanum Extract was injected into the Thorax of a Crow which had been caught in

in a Spring-trap.

The bird immediately fell down & was apparently dead in one minute, without any other symptom than muscular prostration.

Autopsy. Immediate.

The hearts action had ceased, but was renewed for eight minutes after irritation.

No odour of the Extract could be perceived on the Pleural surface, but was very evident in the Lung substance.

The organs & viscera appeared normal.

A slight contraction followed irritation of the Sciatic nerves.

The arterial & Venous systems were filled without distension. Black blood was contained in the ~~Arteries~~ Veins & right side of the Heart, & Scarlet blood in Arteries. The left ventricle was empty.

This Experiment was repeated in another full grown Cow with the same result.

Experiment XXIII. 6. Nervous System.

(of a ~~Rabbit~~ Guinea-Pig).

The

A little blood oozed out in two minutes, & shortly after formed a coagulum over the wound.

The skullcap was exposed in a full grown female Guinea Pig, & small portions of bone were removed with Scissors, from the Parietal portions of the Parietal bones. The Dura Mater was thus exposed. It was cut through, the surface of the brain uncovered, & a horizontal slice removed with a sharp knife. A considerable amount of bleeding occurred & a lump piece of lint was therefore placed on the cut surface of the Brain. No nervous phenomena were produced by this operation. In fifteen minutes the Cloth was removed, & on the comparatively clean surface of Brain, fifty minims of Syrupy Extract was allowed to drop.

The first symptom observed was paralysis of the posterior extremities; in twelve minutes they began to spread, the guinea pig being however still active. In fifteen minutes a quantity of green ish, grumous looking matter issued from the mouth. (When examined afterwards, microscopically, this was found to be similar to the Contents of the Stomach). Movement accompanied this escape, of tension of the Abdominal parietes & drawing together of the limbs, giving the idea of straining.

Faeces

Feces were passed in twenty minutes, & Urine was voided shortly after. Hearing & Sight are unaffected & the contraction of the pupils very slight.

The paralysis of the Extremities became gradually greater & greater, & in one hour the Guinea-pig could only Stagger from one place to another, with fore limbs.

Feces & Urine were passed at intervals; the former was almost liquid in fifty minutes. A discharge very similar to milk took place from the eyes. The respirations became noisy & laboured, & accompanied in twenty minutes with a distinct Spasm in the muscles of the Extremities.

In one hour & fifteen minutes, panting produced cries of distress, but no reflex movements.

In one hour & thirty minutes the posterior Extremities had yielded & the animal was supported on the Pelvis & Anterior Extremities. Severe Spasms occurred twice during which the animal fell on the side & immediately recovered itself. The Respirations

Respirations were at this time very laboured. From this stage the symptoms diminished, & in two hours the animal could walk about & the Diarrhoea had ceased.

Eight hours afterwards, the Guinea pig was found dead.

Autopsy Ten hours after the administration. Great venous congestion in the Chest. Right & left sides of the Heart contain dark, partially coagulated blood.

Lungs congested; two small detached portions sink in water. A quantity of frothy mucous found in the Pharynx & Covering the Rima Glottidis.

Brain congested, & distinct signs of inflammatory action immediately in the neighbourhood of the injured portion. No odour of the Extract was perceived. The Spinal cord also very slightly congested in its Cortical Substance.

The Organs Generally dark & congested, & the vessels contained loosely coagulated blood.

Remark. This Experiment does not shew that death was produced by the application to the nerve-substance, only that this substance Contained

tained a sufficient number of absorbing blood vessels to produce this result.

Topical: when applied to.

1. Muscular tissue.

Experiment. XXIV. (of a Frog).

The Skin was carefully dissected from the right posterior extremity of a Frog. All the Structures of the Thigh, except the Femur, were divided about the middle of that bone, & the limb thus prepared was steeped for five minutes, in a quantity of the Nectar, care being taken to prevent any struggles on the part of that animal. On removing it was found the Contractions could be easily excited by irritation of the Crural or Sciatic nerves. #

The limb was replaced for other fifteen minutes & on examination it was found that simple pinching, & irritation with acids & alkalis or a hot wire, of the exposed nerve or

the subcutaneous tissues, produced no muscular contraction.

The frog exhibited this time perfectly active, & was killed in six minutes by placing the portion of the cut surface connected with the body into this mixture.

Experiment XXV. (of a rabbit).

A full grown buck rabbit was anesthetised with Chloroform, & the Biceps muscle of the right arm exposed & carefully dissected from its connection in the arm; with the its origin & insertion being untouched. All the soft tissues of the arm (except the Biceps) were then carefully dissected from the Humerus, & a ligature was tightly applied to the upper portion of this muscle & second at the lower. The intermediate portion was cut away. A little thin gutta percha cloth was then used to isolate the Biceps as much as possible. The muscular cutaneous nerve was then pinched with the forceps; the Biceps contracted, & the Elbow was flexed.

The Biceps was then pinched over with the tympan

Extract

Extract. In four minutes all quivering of the muscular fibres ceased, & in eight minutes irritations of the nerve extremity or muscular substance, by pricking, pinching, & the action of alkalis, acids & a hot wire produced no effect.

The animal died in thirty minutes with the symptoms, & appearances after death, of ~~deep~~ Asphyxia.

2. Nerve-Substance.

Experiment XXVI. (Of a Frog)

The Great Sciatic nerve was exposed in its whole course from the Pelvis to the knee joint, in a large frog. A small portion, about ¼th of an inch long, was separated from the surrounding tissues with Gutta Percha parchment, & painted over with the syrupy Extract.

In twelve minutes an irritation applied to the nerve, above the isolated portion, produced no muscular contraction, while a similar irritation below this portion was followed by contraction.

The frog died in thirty minutes, probably because of the Extract creeping into the neighbouring structures from the Edges of the isolating material.

3. The Heart.

Experiment XXVII. (of a Rabbit).

An incision was made above the Cervical Vertebrae posteriorly & the ~~first two~~ the Spinous processes & Laminae of the first two Cervical vertebrae exposed in a young rabbit (five months). By bending the neck forwards a sufficient Space was obtained between the first & Second Vertebrae to admit a small probe. This was passed about a quarter of an inch upwards & downwards & the Respiratory Centre was thus completely destroyed. & the rabbit instantly killed.

The Chest was opened & the Heart was found beating slowly & regularly. In four minutes afterwards, five minims of the Syrupy Extract was injected into the right auricle, with Wood's Hypodermic Syringe. The action of the Heart was instantly stopped. Irritation could however produce a laboured contraction for ten minutes.

No blood escaped when the needle point of the Syringe was withdrawn. The Heart Chambers were found distended & containing normally diffluent blood, on incision.

Experiment XXVIII. (of a Rabbit).

Another Rabbit, five months old, was killed as described in Expt: XXVII. & the Heart exposed. In four minutes the

the contractions were 88 per min. & at this time the entire cardiac surface was pervaded with the sympathetic impulse. In one minute afterwards the contractions had entirely ceased, but in one minute & a half the left ventricle spontaneously resumed its action, & in two minutes the entire heart was contracting at the rate of 76 per minute.

The application was thrice repeated with similar results, a longer interval occurring each time between the suspension & recovery of the Cardiac Contractility.

These experiments were repeated on Dogs with the Heart removed from the body & empty, & the results were the same.

4. The Skin. Alimentary Canal

Experiment XXIX. (of a Rabbit).

The Vermicular action of the Intestines was very active in Expt. XXVII. & could be increased by direct stimulation of the Gut.

A portion of the small intestine - about two inches long - was separated from the Alimentary & isolated with Gutta-Percha parchment. This

was

was isolated covered with syrupy Extract by means of a Camels' hair brush.

The Vermicular action in this portion of Intestine immediately ceased & the painted portion became comparatively flaccid. Irritation had no effect on it. It was distinctly observed that whereas Contraction ran along the Gut towards this portion it ceased at the margin where the Extract had been applied, appeared to skip over it, & was continued at the other end, at the healthy intestine.

The power of Contraction was not recovered by the painted portion.

This Experiment has been frequently repeated with the same results.

5. Skin.

Experiment XXX. (of a Rabbit)

A Corrigans Cautery was placed in boiling water for twenty minutes, & immediately applied to the Cuticle of — previously shaved — of a full grown rabbit, at the right Iliac flank. ~~Tow bow~~ It was kept in Contact for six minutes. Tow hours afterwards a blister was formed, & by removing

removing the Cuticle the Brain was exposed.
This was covered with twelve minims of the syrupy Extract.

The rabbit was examined at various intervals for four hours without any change having been observed.

It continued in perfect health for two days, when another Experiment was tried with it.

Experiment XXXI. (Earth-Worm

-a-

A little syrupy Extract was painted over the whole length of a large Earth-worm. It immediately began to wriggle in the dish where it had been placed. In six minutes progression was impossible, the only movement being a slow waving motion of the tail. This ceased in ten minutes, & slimy mucus was exuded & the worm lay contracted & swollen. All reflex Excitability was also lost; & in fifteen minutes the worm was dead.

-b-

A large Earth-worm was painted on the posterior half with the syrupy Extract. It wriggled about for a short time the movement being equally shared by all parts. In six minutes the posterior half, or painted portion, was nearly motionless, in ten minutes

minutes it lay perfectly passive, & contracted.
The anterior half continued active for thirteen minutes & was perfectly quiet in fifteen.

—C—

The anterior half of a large Earth-worm was painted with Upas Extract. In five minutes an evident diminution had occurred in the movement of this part. In ten minutes it was perfectly motionless from an irritation of the anterior half.
The posterior half continued, was not completely paralyzed for thirty-five minutes.

Experiment. XXXII. Of a Leech
The anterior half of a Leech was painted with the Upas Extract. Wriggling immediately followed.
The movement of this portion gradually diminished & in seven minutes it was perfectly quiet, a little swollen, & retracted.
The posterior half continued to move for ten minutes, & the Leech was quite dead in thirteen.

6 Mucous membranes
a. Nasal.
Experiment. XXXIII.
A fine camel's hair brush dipped in the Upas Extract

Extract was passed thrice into the left nostril of a full grown Rabbit — care having been taken that the brush should not contain a sufficient quantity to allow any to escape into the Pharynx.

A copious mucous discharge followed in four minutes after the application, from both nostrils, but a larger quantity from the left. In six minutes the Pupils were contracted; in ten minutes it fell down & lay in any position with noisy & laboured respiration. In twenty minutes the Rabbit was dead.

In the Examination after death, the symptoms already detailed as resulting from Asphyxia were seen. The Entire mucous membrane of the left nostril was red & inflamed. No abnormal appearance was present in the right nostril.

b. Auditory Membrane.

Death was also produced, with the symptoms of Asphyxia by injecting ten minims of the Cyanpy Extract, also by injecting an infusion of Eight grains of Kunalin from Arachus of distilled water, into the Auditory Canal in a Rabbit & Mongrel dog.

c. Conjunctiva.

See Expt: XXXIV.

J.

7. The Eye.

Experiment XXXIV. (Of a Rabbit).

The left eye-ball of a full grown white rabbit was painted over with the Gympy Extract. This appeared to cause no symptoms as far as could be judged from the manner of the Rabbit. The lachrymal secretion was considerably increased in two minutes & the eyelids semi-closed.

In three minutes the left Pupil was distinctly contracted & in about five minutes was only the one sixth of an inch ⊙. The Respirations became noisy at this time.

In fifteen minutes the contraction had become extreme ⊙. though still mobile. No change was observable in the right pupil. A large quantity of faeces, very wet, was passed. & Urine freely voided.

In twenty minutes a slight degree of contraction could be perceived in the right pupil, but this did not increase.

No distinct evidences even of muscular paralysis, & when lifted by the ears the Rabbit struggled violently. It was observed that during these struggles the contraction of the left Pupil was diminished, & the right became slightly dilated.

Ether fumes were passed for forty five minutes, & afterwards the Contraction of the left pupil was the only symptom.

This

This was very much diminished in two hours, but continued for eight hours, & had disappeared in ten.

The Rabbit recovered completely.

In another experiment in which a larger quantity of Extract was applied, the muscular prostration was much greater, & the contraction of the Pupil continued for twenty hours.

Modified Actions.

1. With boiled Kernal

Experiment XXXV. (of a Rabbit.)

Twenty grains of powdered kernal was boiled for two hours in water & inserted into a cavity in the Sub Cutaneous Cellular texture of a Rabbit. After struggles followed the introduction, the breathing became rapid, the posterior extremities were unsteady, & the rabbit fell down in four minutes.

The Pupils contracted, very little kicking ensued when the animal was lifted, & it remained in my possession. In Six minutes the reflex function of the eyelids was lost, & in Seven, the Respirations had ceased.

Autopsy

Autopsy. Immediate.

The Pupils dilated during the opening of the Chest.

The Heart was found Passive & distended. All its chambers contained blood & the difference in Colour between the right & left sides was very marked.

The Vermicular action of the Intestines was very feeble.

The Sciatic & Phrenic nerves were pricked without any Effect.

No congestion in any Viscera.

The Mesenteric Arteries & Veins were distinctly different in Colour. The Abdominal Aorta & Vena Cava were full, & contents were of normal colours.

The Stomach & Bladder were full.

Rigor Mortis began in one hour.

No redness or any other morbid appearance in the region of application.

2. With the Bean boiled Entire.

Experiment ~~XXXVI~~. (of a Rabbit).

An entire Bean weighing twenty-two grains was boiled in Water for four hours. The kernel was then dispersed from the Spermoderm, & found Colourless of a brownish Colour.

Colon. One Cotyledon, weighing probably forty-six ~~twenty-~~ or ~~forty-~~ eight grains, (the other having been afterwards dried & found to weigh ~~forty~~ twenty-six grains), was made into an emulsion with a little water, & introduced into the right flank of a full grown rabbit.

No effects seemed to have been produced until twenty minutes when the rabbit began to move its jaws & grind its teeth as if chewing. In fifty minutes wet feces were passed, & more than the pupils appeared very little contracted. Very soft feces & urine were now frequently - almost incessantly - voided for two hours, when this symptom diminished, & entirely disappeared in four hours.

The Rabbit was completely unaffected in six hours.

3. With Strychnine & Physostigma.

Experiment XXXVII. (of a dog).

Three-tenths of a grain of Strychnine was sprinkled on a recent wound in the left flank of a Mongrel dog.

The Animal stimulated & fell in four minutes, the muscles of the Extremities & trunk became rigid & hard, & in five minutes, the Pupils were dilated, &

Spasms

spasms rapidly succeeded each other. Subcutaneous cellular tissue

Five minims of syncopy extract was injected into the wounded flank, immediately approximating the previous application of Strychnine.

Nearly immediately afterwards the spasms ceased in the left limb, & in a short time in the right. In three minutes after this injection, reflex action could not be excited in the posterior extremities, the pupils remained dilated, & clonic spasms frequently recurred in the ant: extr. & trunk.

In seven minutes the eye-lids closed, & when opened the pupils were found pointing upwards & outwards.

No reflex muscular action occurred in the posterior extremities, but slight spasms were observed in all other regions.

In twelve minutes the animal was dead.

Autopsy. Immediate.

In opening the thorax, several blood-vessels were cut & very dark blood escaped. The cut muscles contracted vigorously.

The heart appeared shrunk but was contracting vigorously. The vessels of the thorax were injected with black blood.

Irritation of the Phrenics produced no contraction of the diaphragm; no contraction could be caused by pinching the Great Sciatic on either side.

4. With Artificial Respiration.

Experiment XXXVIII.

Five minims of syrupy extract was injected into the cellular tissue in the left flank of a kitten, two months old, & artificial respiration performed for fifteen minutes. This did not appear in the slightest degree to modify the action. The animal was flaccid in three minutes & the Pupils contracted.

On exposing the Heart, it was found perfectly passive & distended.

Experiment XXXIX.

One minim, of the same extract as Expt 38, was injected into the left flank of a kitten of the same brood as the above, & artificial respiration was performed for fifteen minutes.

During the whole time the power of reflex movements was unaffected. On opening the thorax the Cut muscles contracted, & the Heart was found acting at the rate of 86 per minute.

This action continued for six minutes after the chest had been opened, & the Cardiac contractility was retained for one hour.

Actions on the Medusae

Experiment XL. (on the Beröe Pometata).

Thirty minims of syrupy extract was mixed with five Ounces of Sea Water, & a large & healthy Beröe was introduced into the mixture. The Six longitudinal rows of Cilia became extremely active & the mouth contracted & dilated normally.

The first effect was the apparent paralysis of the contractile tissue of the oral orifice, & the permanent dilatation & flaccidity of this Opening. In 10 minutes, Constrictions were observed in various portions of the Animal body, & shortly after the ciliary action in the upper third (towards the oral orifice) of each row had ceased.

In twenty minutes all ciliary action had ceased & the Animal was perfectly flaccid.

Experiment XLI. (on the Thaumantias - ?)

A Specimen of the Thaumantias was introduced into the same fluid as Expt. 40. The Contractions of the body were very active for six minutes, then gradually ceased, & in twelve minutes the animal was dead.

Actions

Actions on the Infusoria.

Experiment XLII.

An infusion Mixture of Chopped hay & water & one of Powdered kernals of Physostigma were placed in a large tube & placed in a position exposed to the sun's rays.

When the two infusions were examined a fortnight afterwards, no difference could be perceived in the number or variety of the Infusorial Protozoa which were found with the Microscope in each.

A drop of acetic acid of Glacial strength, added to a preparation from the Physostigma infusion, instantly destroyed all vitality. This was repeated with the infusion from Chopped hay with the same result.

Actions on Vegetables

Experiment XLIII.

An infusion of half an ounce of Spring water with twelve grains of finely powdered kernal was placed in a test tube & a second test tube was filled with spring water. Two sprigs of blossom from the flowering Currant & two flowers from the Primrose were cut each pair resembling each other as far as possible, & into each test tube

test tube a blossom of Primrose flowering Currant was placed.

Twelve hours afterwards no difference or change could be observed.

In Eighteen hours. the blossom of flowering Currant in the Infusion of Fennel was slightly faded, the leaves, leaf & flower stalks, & petals were distinctly soft & had lost their proper firmness.

No change was perceptible in the other flowers.

In twenty-four hours the blossom of flowering Currant was quite withered & drooping.

No Change had occured in the other flowers & they remained healthy & fresh for four days.

This Experiment was repeated with Similar results.

Experiment XLIII.

Incisions were made in the flower stalks of ~~blooming~~ the following plants in full bloom:— Narcissus, Hyacinth, Snowdrop, Primrose, Valerian, & varying quantities of Extract of Physostigma were inserted into the Stems.

No Effect was produced in any instance.

Actions on Man.

Constitutional.

1. With the Kernal.

Experiment I.

Steat Six grains of finely powdered kernal, two hours after taking food. The pulse was examined at different times within the previous fifteen minutes, & found to average 68 per minute.

In six minutes the pulse was 74 per minute & no sensation or other symptom was experienced.

In 19 minutes, A slight degree of a peculiar sensation was experienced in the Epigastrium, beneath the Sternum & very much in the position of the Stomach.

Pulse, 72.

In 15 minutes, Pulse 76.

— 20 minutes, Pulse 75. Epigastric sensation More distinct.

— 25 — . Pulse, 77.

— 30 — . Pulse 72. Sensation continues to occur at intervals, still very slight.

— 35 — . Pulse 69.

— 40 — Pulse 66. Sensations recur.

— 45 — Pulse 68.

— 50 — Pulse 64. A slight degree of dizziness. The Epigastric sensation is much increased.

At

It now resembles the somewhat painful sensation which is produced when large pieces of food are suddenly swallowed. The feeling is also recurs at intervals. It is at first slightly indicated by a sensation in the thorax near the top of the Sternum. this extends downwards becoming more & more distinct & even painful, & when it reaches the Epigastrium, eructation usually occurs. There is a distinct escape of gas & this is followed by a removal of the symptom from the lower Sternum to the top, & even to the throat. The eructation, therefore, occurs in the middle of this symptom.

The above description does not apply to every recurrence of the symptom. They are sometimes much more imperfect. the sensation & eructation may also occur independently of each other.

— 55 — Pulse 65, full & regular & strong, Flegmt sensation & eructation.

— 60 — Pulse 62, rather feeble ~~& irregular~~. Dimness of vision & dizziness.

— 65 — Pulse 62. Increase of Head symptoms with a little perspiration.

— 70 — Pulse 60, very small & wiry, but regular. Nausea. No further Epigastric sensation since 55.

— 75 — Copious perspiration all over body. Nausea

to

to continue reading, especially because of dizziness.
Difficulty in walking. Pulse, 62.
— 80 — Pulse, 60; very thready & difficult to count.
— 85. Pulse 60.
— 90 — Pulse, 58. Respiration accompanied with a little difficulty & slight degree of Dyspnoea.
— 95 — Pulse 59. very feeble & with occasional intermissions.
— 100 — Pulse 56. Emetation without Nausea. Consciousness, Nausea, & dizziness.
— 105 — Pulse 56. Thready & intermittent.
— 110 — Pulse 58. Head Symptoms greatly diminished. Dizziness & Nausea very slight. Very great difficulty in walking. Respirations require no effort.
+ 120 — (two hours) Pulse, 60; rather stronger.
Two hours & 5 minutes. Pulse, 59. Emetation without Nausea.
— — — & 10 minutes. Pulse 60 distinctly fuller.
— — — & twenty minutes. Pulse 58, same as last. Felt very sick & according went to bed. Experienced a little difficulty in undressing, & especially in unfastening my shirt buttons.
Some Conscious of having remained awake for

for some time in a drowsy condition.
Slept well, but dreamt a good deal, which was the more unusual, as I very seldom dream.
Rose morning Iron at the usual hour. Had a good appetite, but experienced a slight degree of dizziness all day.

Experiment II.

Three Calculations of the pulse, within fifteen minutes, gave the average of 74 per minute.
Six grains of the Powdered Kinnel was then carefully chewed & swallowed.
In three minutes the Pulse was 76.
— five — , 70. & the slight nausea accompanied with nausea occurred.
— ten — , 72.
— fifteen — , 66. with slight nausea.
— twenty — , 66. Nausea more intense & accompanied with nausea. I thought I experienced a degree of muscular weakness in talking, & accordingly lifted a dumb-bell which I could in ordinary circumstances lift with the greatest ease. I found this weight a great burden & could scarcely extend my arm with it in my hand. When going through this

this little service, I found the greatest difficulty in maintaining the wrist pulse, with perfect steadiness.

In thirty minutes, the Pulse 68; very soft & compressible. The Epigastric pulsations seem without pulsation.

— thirty-five —, 62; feeble.

— 40 —, 62.

— 45 —, 64; Still feeble.

— 50 —, 60. Pulsations seem in Epigastrium in quick succession.

— 55 — 58. very feeble.

— One hour, 58. No pulsations. Dizziness.

— — 5 —, 60; compressible.

— — — 10, 57.

— — — 15, 58. wiry; & compressible. Dizziness.

— — — 20 —, 56.

— — — 30 —. 54. wiry, soft & compressible & with occasional intermissions.

— — — 40 —, 54. Some Characters as 30. Dizziness

I took a cup of Coffee at this time.

— two hours pulse, 63; somewhat stronger.

— — — & 10 minutes, 58. Pulsation. Dizziness quite gone. Still perceive muscular weakness.

The Pulse continued to range between 60 & 65 for a while

three hours from the commencement of the Experiment. When the observations were discontinued.
The dizziness & nauseous weakness had disappeared by that time.

Experiment III.
Pulse 71.
Eat nine grains of powdered kawal. In three minutes violent epigastric sensations occurred & in six minutes emetation.
No change was observed in the frequency of the pulse for twenty minutes. The dizziness & general lassitude became so great at this time that the reading of "Silas Marner" had to be discontinued & the pulsations could not be counted.
In walking down stairs great dizziness of vision was experienced. Feeling
The progression & gait were very unsteady, & I can remember having encountered the wall & hand rails more than once in my way. Immediately went to bed, undressing with some difficulty & on a chair, & in a short time was asleep. This
It was about nine O'Clock with evening. Next morning arose at seven, took a bath in the Sea, & had no sensations whatever during the day.
Remarks: The above was written down in the forenoon
of the

of the day following the Experiment when the particulars were fresh in my memory.
In Experiments I & II. I had the note paper with me & wrote down every thing as it was observed.

2. With the Tincture.

Experiment IV.
Pulse 70.
Ten minims of the Tincture of Physostigma was diluted with half a drachm of distilled water & drunk.
In five minutes the Epigastric sensation was perceived. & the Pulse was 76 per minute.
— one hour the Pulse was 63. feeble & steady.
— — & a half the Pulse was 54 very steady & weak.
It continued between 52 & 60 for one hour longer (2½ after administration).
In four hours the Pulse was 68. Strong & full. All symptoms had entirely disappeared.

Topical.

1. On the Eye.

With the extract.

Experiment V.

The point of a surgical probe was dipped in the alcoholic extract (page), & applied to the ball of the left eye.

Copious discharge of tears immediately occurred, & was followed by dimness of vision.

In five minutes the left pupil was a little contracted. & in eight minutes this was very evident; the left eye only one half the size of the right.

In ten minutes the left pupil was very small. O, & vision with this eye very imperfect. The affected Pupil was perfectly mobile.

A pain was now experienced in the Supra orbital region of the left side, & sensation of heat in the left eye ball.

In thirty minutes no change had occurred in the right pupil; the left was a mere speck. Vision was almost lost in this eye, & there was a little redness of the eye, & pain to the light.

In forty minutes Comparative dimness of the left eye.

In one hour & half all disagreable sensations had gone, the dimness of vision was diminished, but the contraction

Contraction of the Pupil continued.
In three hours the dimness of vision had diminished.
The contraction continued unchanged.
In four hours the dimness had disappeared, but the contraction continued unchanged until twenty-four hours. It gradually diminished after this, but very slowly. as this symptom continued for five days.

Experiment VI.

A small quantity of the Extract was applied to both Eye-lids of the right side, avoiding any contact with the Conjunctiva.
In six minutes the right pupil was contracted & effects were produced exactly similar to those described in Experiment I, with the exception that the Contraction disappeared in three days & a marked immobility was produced in the Eyelids, accompanied with a disagreeable sensation of dryness. A slight degree of inversion of the upper Eyelid was also produced when the Eye was being closed.

2. On the Skin

Experiment VII.

Experiment VII.

A test-tube containing an ounce of Mixture was applied with its open mouth in contact with the Skin at the point of the Index-finger of the left hand, for twenty minutes.

No difference was produced in the Tactile or Common Sensibility of the finger.

Experiment VIII.

A small piece of flannel was soaked in the Mixture & with this a portion of the Dorsum of the hand - over the first & second Metatarsal bones - was rubbed for fifteen minutes. (One drachm & a half of Mixture used).

The Common Sensibility in this region was almost entirely destroyed; pricking with a needle point produced very little sensation & the affected region could be defined by a succession of pricks from the unaffected Skin, over the applied region & to the unaffected portion beyond.

This was repeated with the Extract & the results were the same.

Thomas R. Fraser.