

To Joseph Lovell Esqum, Surgeon General of the U S Army.

With an honest desire to contribute, if I may, a mite to the promotion of Medical Science, & in accordance with your wish & the general views of the Department under which I act, I have the honour, very respectfully to submit for consideration the following Experiments & observations upon the gastric fluid, & functions of Digestion, as made upon Alexis, Saint-Martin, whose ^{casely} gunshot wound & extraordinary recovery from a rupture & perforation of the Diaphragm & Stomach, was reported in September 1824. & published in the Philadelphia Medical Recorder, in January 1825 — a first short series of experiments, was also recorded in the same Journal in 1826.

Disappointed at that time in my expectations of continuing the experiments, by the faithless absconding of my Subject to Canada, I was placed in the unpleasant predicament of having promised, without being able to afford the Public any satisfactory ^{results}, or myself an opportunity for further observations, til the Summer of 1829.

At this time I again regained possession of my Frenchman through the kind exertions of the agents of the American Fur Comp^y at Michillimackinac, by whom he was transferred to me at Fort Crawford, Prairie Du Chien. Up: Missip^t, in August 1829.

Here I instituted another series of Experiments, which for reasons sufficiently obvious to you & unnecessary to be mentioned here, have not yet been published, but are herewith partially submitted.

In ^{the midst} of these experiments, I was again interrupted, in the Spring of 1831, by the necessity of relinquishing his engagement, to afford him a chance of returning to Canada to provide for his indigent family.

These, with other causes, not in my power to obviate & control, have prevented more satisfactory results, perhaps, & delayed an earlier communication of the subject.

Having him now re-engaged for a season, I hope to have the satisfaction of presenting to your favorable consideration, the following Experiments & Observations, as the result of my faithful, though feeble abilities, but diligent efforts, to contribute to the advancement of Physiological improvements.

From the vast number of treatises, observations & experiments that have been made on the subject of Digestion, almost from time immemorial, to the present day, by the most illustrious & learned of the ancients & the wisest & ablest Professors & Physiologists of modern & present times, it may, perhaps, be thought, that these experiments & Observations are altogether gratuitous, unnecessary & useless, many having already been communicated to the profession in far more Scientific & satisfactory forms - But following the examples, & guided by the prompts of the most eminent & useful of the profession & having so rare & singular an opportunity, I cannot, in justice to my views of the importance of the subject, omit communicating such facts & Observations, as have been in my power to collect, however imperfect & unimportant they may appear, or feeble my ability to do it satisfactorily.

But in offering the following, I can most truly assert that no favorite theory, system, or hypothesis, preconceived opinions or partiality for popular authority, have had any influence in making or recording them -

A mere tyro in science, with a mind free from every bias, I commenced them, as it were, by accident, & continued, desultorily to prosecute them, without regard to any particular arrangement, or the confirmation of anything

save plain & palpable truths & true physiological facts -
aiming singly at the more perfect developement of the nature
of the Gastric juice & process of Digestion in the human Stomach
- subjects which neither time, nor talents, nor labour, nor learning,
has yet satisfactorily illustrated.

If, in any degree, I succeed, in thus contributing to the
cause of science, I shall be satisfied with having bestowed
my time & patience upon the subject - simply even to afford the
materials for the Physiologist to cultivate & improve -

Small intestines, where their presence is indispensable
to the due & healthy separation of the nutriment & fluids
of the alimentary mass, after it has been reduced to
chyme by the Gastric juice ^{in the duodenum.} & prepared for the
trinary operation of all the ~~adjuvant~~ ^{of the Gastric, Hepatic & Pancreatic} fluids
preparatory to enter the lacteal vessels for ~~the~~
more perfect ^{assimilation} ~~assimilation & conversion into blood~~
~~serum & fibres.~~

Bile & Pancreatic juice are not essential to the operation of
the Gastric fluids in ^{the} Stomach's digestion, ^{or at all necessary} ~~with another~~
in the formation of chyme. neither do they, in my opinion,
come to its aid in natural & healthy digestion - They
are not only not necessary, but evidently ^{prejudicial and} ~~un-
essary~~ ~~to its operations.~~ when ever accidentally mixed
with it in the stomach - They seem only required for the
formation of Chyle in the second stage of digestion,
performed in the duodenum & Small intestines, where their
presence unites with the chyme from the stomach, as is
possible to the due separation of the nutritious from the
excrementitious parts of the ~~alimentary~~ chymous mass, as it
arises in the vicinity of the ~~entrance~~ ^{of their common duct}
~~into the intestine~~ & stimulates them ^{to discharge their respective} ~~respective~~ fluids to flow
and which combining with the chymous mass, separates forms
the chyle preparatory to its entrance into the lacteal vessels
for more perfect assimilation - this appears to me
to be the principal & primary use & destination of the Hepatic
& Pancreatic fluids, - that they are indispensably necessary
& important in the formation of Chyle in the intestines
& ~~of the chyle~~ ~~in the intestine~~ ~~from the stomach.~~ I have
not the least doubt, having as I strongly believe, had several
demonstrations ^{of these facts, in some of} the following experiments on artificial
digestion - that, they ~~are not~~ ^{very seldom} ~~not~~ ^{seen?} ~~never~~ ^{never} naturally
permitted to pass the pyloric orifice of the stomach with
the fluids of the stomach. I am equally convinced, from ~~my~~
^{the 2002 examinations} having found any appearance of either of them there, in more
than 100 examinations of the contents of the stomach, both

in its empty & full states. during all stages of digestion & periods of fasting - extracting the Gastric fluids & Chymous fluids. at different times under various circumstances & conditions. as ~~is~~ ^{is also} shown by the ~~following~~ ^{same} experiments.

In support of the foregoing ~~remarks~~ & suggestions & remarks. I offer the following observations & experiments -

The following ~~Experiments~~ ^{is a second series of} ~~Experiments~~ ^{on digestion} performed on the Gastric fluids of the stomach of a dog is ~~from the 5th of Nov. 1829~~ ^{March 1831}.

Exp 1st

Dec 6th 1829 - 9.0K am. To ascertain the variations of Temperature of the interior of the Stomach. under various circumstances & conditions of health & the system. & ourselves of atmosphere

I introduced the glass tube of Fahrenheit's Therm. thro' the artificial opening into his stomach, nearly the whole length of the stem - in 6 or 8 mins: the mercury became stationary at 90° - The weather cloudy, damp & misty - raining - ground wet, muddy & thawing - Wind S + mild - Therm. in a northern exposure 63° - commenced raining at 11.0K am. & continued thro' the day with oppressive atmosphere -

Experiment 2^d - To ascertain whether there be the Gastric juice accumulated in the stomach during periods of fasting ~~fasting~~ ^{abstinence from food} or even ~~fasting~~ ^{front the influence of} ~~fasting~~ ^{the influence of} - I made 18th Jan 5th 1830 - 8th Feb 1830

The following ~~experiments~~ ^{observations} -
 Dec 5 - 1829 - Eight o'clock am - Introduced, at the perforation a gum-elastic siphon. after 12 hours abstinence from either food or drinks - Introduced, at the perforation a gum-elastic siphon. to draw off some Gastric juice - found very little - a draw or two only - no accumulation in the stomach

Dec 12th 1829 - 3.0K P.M. - Introduced siphon to extract Gastric juice - drew off 2 or 3rd only. Stomach appeared not to contain any in a full state -

Series 2

- 1. villous coat - its appearance
- 2. Gastric juice - its natural healthy appearance. Seeds of -
- 3. Temperature of Stomach - variable with circumstances or
- 4. Gastric juice - not accumulated in Stomach during fasting
 excited to flow by the application of almost
 diffusible in water. with a strong

5. Digestion - { artificial.
 commences immediately on receiving aliment
 general period of
 different time required for different ^{amount} ~~parts~~ of
 disengagement cause of
 of air & great
 of fluid about

3 1/2

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appears to me
 continuation of the Hepatic
 very are in essentially necessary
 formation of Chyle in the intestines

the least doubt, having as I firmly believe, had several
 demonstration of these facts, in ^{some of} the following experiments on artificial
 digestion - that, they ~~are not~~ ^{very seldom} ~~are not~~ ^{usually} ~~are not~~ ^{seen}. & never naturally
 permitted to pass the pyloric orifice of the stomach to mingle with
 the fluids of the stomach. I am equally convinced, from ^{in health} ~~never~~
 the 2000 examinations
 having found any appearance of either of them there, in more
 than 100. examinations of the contents of the stomach, both

From the foregoing experiments & observations we have the following Corollary -

That natural stomach digestion of aliment is effected entirely by the solvent action of the gastric juice.

That a healthy condition of the system generally, but particularly of the stomach, is indispensably necessary to perfect digestion of aliments.

That the perfect & healthy digestion depends upon the due qty aliment rec^d. in exact proportion to the requirements of nature,

That the healthy secretions of the Gastric juice is in exact proportion to this requirement.

That an undue qty of food rec^d. opposes & retards the digestive powers, & suppresses the assimilation of the usual qty of nutriment.

Jan 24	Dr	Mr	.8	96
" 25	"	Mr	2.	96
Mar 17	Dr	Mr	38.	95
" 18	Clear		6.	96
Jan 24	Dr	Mr	.8	96
" 25	"	Mr	2.	96
Mar 17	Dr	Mr	38.	95
" 18	Clear		6.	96
Jan 24	Dr	Mr	.8	96
" 25	"	Mr	2.	96
Mar 17	Dr	Mr	38.	95
" 18	Clear		6.	96
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Jan 24	Dr	Mr	.8	96
" 25	"	Mr	2.	96
Mar 17	Dr	Mr	38.	95
" 18	Clear		6.	96

To the Gastric
fasting experiments, abstract
1830 Jan 7 31 1830 - 8 Oct

the following experiments were conducted
Sept 2
Dec 5. 1824 - Eight o'clock a.m. - Introduced
a quantity of Siphon. after 12 hours abstinence
in the food or drinks - Introduced. at the first
a gimmed tube siphon. to draw off some Gastric juice - found
very little - a drachm or two only - no accumulation in the stomach
Jan 12 1825 - 3. 0/4 P.M. - Introduced siphon. to extract Gastric juice
- drew off 2 or 3 3/4 only. Stomach appeared not to contain any in a
free state.