

IND MED SURG 28.514-516, 1959

TRAITÉ

L. Tanquerel des Planches, M.D.

1809-1862

MALADIES DE PLOMB

OU SATURNINES,

PAR

L. TANQUEREL DES PLANCHES,

DOCTEUR DE LA FACULTÉ DE MÉDECINE DE PARIS

*A Historical Review
of his Classic Masterpiece
on Lead Diseases*

• ROBERT T. LEGGE, M.D.
University of California
Berkeley, California

« Lorsque de tant et que j'y suis et caprice par l'usage
de cette langue, j'ai fait mes meilleures productions, n'ayant pas
espéré pour en faire la matière, et pour m'adresser aux
qui voudront après moi, des choses non point être en-
tendues par eux-mêmes : ce n'est pas moi, mais le bon sens
qui les a guidés. »

Cherchez l'ouvrage Paris, de l'avis de l'auteur de l'ouvrage

TOME PREMIER.

PARIS.

VERNA, LIBRAIRE-ÉDITEUR,
RUE DES GRANDS-AUGUSTINS, N° 16.

1839.

One hundred twenty years ago there appeared on the horizon of the medical world a French physician, L. Tanquerel des Planches, of the faculty of medicine on the clinical staff at the Hospital of Charity in Paris where he published the results of his investigation on lead diseases. This remarkable investigator, whom Alice Hamilton called the "Columbus of lead poisoning," recorded 2,171 cases of lead diseases at the Hospital of Charity after eight years of meticulous clinical observations, plus careful occupational histories and clinical analysis.

In studying the etiology of these cases he made numerous experiments on animals and performed many autopsies on deceased patients who succumbed to lead disease. He was familiar with medical history and with the writers of the past on lead poisoning. Dr. Tanquerel began his inquiries in 1831. Three years later he published a thesis on lead paralysis and finally, in 1839, published the two volumes of his classic masterpiece entitled *Traites des Maladies De Plomb on Saturnisms*. This work was crowned with the Montyon prize of 6,000 francs awarded

by the Royal Academy in 1841 as being the best work in extending medical knowledge and for diminishing the danger of contamination associated with certain trades in the mechanical arts. Tanquerel was a real scientist, preferring truth before all else; a prerequisite of the true investigator.

He classified lead diseases under four well determined forms: colic, arthralgy, paralysis and encephalopathy. These affections have independent existence and have no real or necessary relations except those of their common origin, yet they may coexist. Of lead colic, this being the most frequent and best known, he numbered 1,217 cases, arthralgy 750, paralysis 127 and encephalopathy 72 cases. He carefully described the primary effects of exposure and absorption of lead dust by the respiratory and digestive organs. The first characteristic manifestation is the leaden discoloration of the teeth and gums. He explained that this was due to sulfureted hydrogen evolved in the mouth combining with the circulating lead in the tissues. Priority for the recognition of this sign is due him and not to Burton. Another commonly

described effect is the lead taste, breath and odor. The third item was lead jaundice, the results of the accumulation and absorption of great quantities of lead particles which produce this earthy yellow color of the skin and tissues. The fourth is lead emaciation.

He cites the various names given in the past by authors regarding this oldest occupational disease such as plumbism, saturnism, huttenkatze and colica pictonum. He well portrayed how lead is disseminated in the atmosphere as fine particles and how emanations inhaled or swallowed are absorbed by the mucous membrane, transformed into oxides or salts that produce the lead diseases. He was definitely satisfied that lead colic is not produced by cutaneous absorption. As to the 1,217 cases of lead colic observed, every individual had an occupational history as a worker in lead. The principal ones were red and white lead makers, painters, grinders, potters, type and bronze workers. He devoted a chapter to predispositions such as season, climate, age, sex, cleanliness, etc., and another to precursors of the phenomena of primary effects that precede lead colic.

Lead Colic

Beginning with lead colic, he devoted chapters to definitions, synonyms, history, causes, predispositions, precursors, symptoms, complications, progress, diagnosis, chemistry, seat and nature, and last, treatment. The other three lead diseases were likewise arranged.

The symptoms of lead colic, as is implied, are severe pain principally located about the umbilicus, often in the epi- or hypogastrium, of a violent, moderate or light degree. He mentioned that the rigidity and depression of the abdomen and the relief of the colic pain by pressure is achieved in seven out of 10 cases. The nausea and vomiting, the contractions of the anus and rectum, borborygmus, hiccough, characteristic breath, saliva, metallic taste and jaundice are familiar symptoms.

In the differential diagnosis of other diseases of the digestive organs, provided by such metallic poisons as copper, mercury and arsenic, he described how the symptoms differ from those of lead action, also of such pathological conditions as ileus, peritonitis, nephritic and hepatic colic. Tanquerel performed postmortems on each of the 49 patients who died of lead colic. There were found no alterations in the digestive tube and only traces of congestion. Such pathologists as Merat, Orfila, Grisolle and Dehaen concur in that they had not been able to discover the slightest traces of inflammation in patients who have died of lead colic. It was Tanquerel's opinion that the seat and nature of lead colic is in the great sympathetics and nowhere else.

Lead Arthralgy

Lead arthralgy is credited to an affection of a neuralgic nature produced by lead and characterized by lively pain in the limbs, lacking redness or swelling, diminished by pressure and increased by motion. It is accompanied by various difficulties, such as cramps, hardness and tension of the painful parts. Next to colic it is the most frequent effect. Lead arthralgy usually accompanied colic, paralysis and encephalopathy in Tanquerel's cases.

He defined paralysis in general as the loss or weakness of voluntary motions and sensibility, or of one of these faculties only. One of these states he termed paralysis and to the other he gave the name of lead anesthesia. Tanquerel made the statement that lead workers most frequently attacked with paralysis are those confined in an atmosphere contaminated by lead emanations. Forty of 108 cases did not have a preliminary colic. Certain symptoms give notice of the approach of lead paralysis: lassitude, trembling, weight loss and coldness. Ninety-seven cases were affected in the upper extremities, mostly in the wrist, forearm and fingers. In 15 cases, paralysis developed in the thigh, leg, foot or toes. A few cases showed paralysis of the intercostals and vocal cords. Paralysis is one of the gravest diseases caused by lead. Of those who died, the autopsy findings, as to the appearance of the cord, spinal marrow and muscles, revealed no evidence of anatomical alterations which would account for the phenomena of the disease. The muscles most frequently deprived of motion are found in the extensors of the limbs. No morbid phenomena have been observed in the central nervous system; which indicates the existence of an organic lesion as the origin of lead paralysis.

Lead Encephalopathy

Lead encephalopathy was known first by Dioscorides, the Greek physician of the first century A. D., who mentioned the delirium produced by lead. Symptoms came on suddenly, with violent cephalalgia, often limited to the forehead, usually accompanied by vertigo or amaurosis and pains in the orbits. Different functional derangements of the brain such as delirium, coma and convulsive forms frequently developed. Of this series of 72 cases, 16 died. At the autopsy there was found a flattening, a shrinking of the cerebral convolutions with increase or diminution of cohesion of the cerebral pulp.

Tanquerel recognized the value of chemical analysis by availing himself of the services of Devergie and Guibort who detected a notable quantity of lead in the brain tissues in encephalo-

pathy. Subsequently, Devergie in 1836 detected copper and lead in normal human organs. This was confirmed by Orfila, the Parisian toxicologist. Professor M. D. Chevreul, the father of organic chemistry, pointed out as early as 1824 the existence of copper and lead in the human body as normal elements. This finding is of the greatest importance in legal medicine.

Prevention and Treatment

The final chapter of this great work is devoted to the prevention of lead disease by hygienic measures, both personal and environmental. He especially emphasized avoiding inhalation and ingestion of lead emanations. He stressed personal cleanliness by baths, washing before eating, by mouth hygiene and clean clothing. He also developed a respirator in which a dampened sponge fitted over the nose and mouth. He pro-

moted clean working places, good ventilation and wet processes to avoid dust. As for therapy, he had no specific, only symptomatic methods. He discredited the use of the popular sulphuric acid lemonade, extensively used at that time.

Tanquerel des Planches' immortal books on lead diseases earn for this astute clinician and investigator a foremost place in industrial medical history.

Since few copies of Tanquerel's book on lead poisoning are available anywhere, it is noted that these were translated into English in 1848 by Samuel L. Dana, M.D. under the title *Lead Diseases*. This same book contains the results of Dana's own investigation of lead poisoning from lead plumbing. This Dana publication is almost as rare as the Tanquerel volumes, but at least the American readers possess the virtue of having a good translation into English.

Occupational Cancer

Repeated sunburn is perhaps the most widespread of the known causes of cancer.

"The belief that nothing is known about the causes of cancer is as mistaken as it is universal," says Charles S. Cameron, M.D., former medical and scientific director of the American Cancer Society.

"A great deal is known," he continued, referring to certain circumstances or agents which appear to favor the development of cancer. "Although we do not know how or why."

"Sunburn, for instance," he remarked, "The connection between the disease and sunlight is so striking that long ago cancer of the skin was dubbed 'sailor's cancer' or 'farmer's cancer'."

A large number of rats, in an experiment, placed in the sun for several hours a day over a period of months became cancerous. Nine out of 10 developed cancer of the skin and always in areas that were exposed and sparse in hair.

"Very fair-skinned people in particular must be careful," warned Dr. Cameron.

He also mentioned other suspects that contribute to the danger of cancer. "Modern men and women who live in cities inhale a rich variety of smoke, dust and fumes. Roads and streets are covered with asphalt which is chemically related to substances that are known to cause cancer," Dr. Cameron said.

Occupational hazards such as those that exist if a human being is working with dyes, arsenic, tar, creosote oil, crude paraffin oil, x-ray and radium, can, if the contact is long enough and intense enough, result in skin cancer.

It must be remembered, Dr. Cameron stated, that these agents are dangerous in causing occupational cancer when the form and amount handled are taken into consideration.

"Finally," Dr. Cameron said, "the known and suspected causes of cancer do not account for the majority of cancer cases. Evidently a more basic cause lies within the living organism itself. The nature of susceptibility is unknown but it is the core of the cancer problem."

—From *Whittier (Calif.) News*, July 1, 1959.

IND MED SURG 28.514-516, 1959

TRAITÉ

L. Tanquerel des Planches, M.D.

1809-1862

MALADIES DE PLOMB

OU SATURNINES.

PAR

L. TANQUEREL DES PLANCHES.

DOCTEUR DE LA FACULTÉ DE MÉDECINE DE PARIS

«Donner que de sources que j'ai vu et copier par l'espace
de dix-sept ans, j'ai fait une œuvre collective, j'ai mis mes
souffrances pour en faire le monde, et pour enlever ceux
qui souffrent après nous, des choses non peut être cop-
nées par ce dessin, ou si elles l'ont été, mais si bien restau-
rées qu'il n'est plus possible.»

Chaque d'abonnement, l'essai, de Laval ou Meur, de l'œuvre

TOME PREMIER.

PARIS.

FERRA, LIBRAIRE-ÉDITEUR,
RUE DES GRANDS-AUGUSTINS, N° 16

1889.

• ROBERT T. LEGGE, M.D.
University of California
Berkeley, California

One hundred twenty years ago there appeared on the horizon of the medical world a French physician, L. Tanquerel des Planches, of the faculty of medicine on the clinical staff at the Hospital of Charity in Paris where he published the results of his investigation on lead diseases. This remarkable investigator, whom Alice Hamilton called the "Columbus of lead poisoning," recorded 2,171 cases of lead diseases at the Hospital of Charity after eight years of meticulous clinical observations, plus careful occupational histories and clinical analysis.

In studying the etiology of these cases he made numerous experiments on animals and performed many autopsies on deceased patients who succumbed to lead disease. He was familiar with medical history and with the writers of the past on lead poisoning. Dr. Tanquerel began his inquiries in 1831. Three years later he published a thesis on lead paralysis and finally, in 1839, published the two volumes of his classic masterpiece entitled *Traité des Maladies De Plomb ou Saturnismes*. This work was crowned with the Montyon prize of 6,000 francs awarded

by the Royal Academy in 1841 as being the best work in extending medical knowledge and for diminishing the danger of contamination associated with certain trades in the mechanical arts. Tanquerel was a real scientist, preferring truth before all else; a prerequisite of the true investigator.

He classified lead diseases under four well determined forms: colic, arthralgy, paralysis and encephalopathy. These affections have independent existence and have no real or necessary relations except those of their common origin, yet they may coexist. Of lead colic, this being the most frequent and best known, he numbered 1,217 cases, arthralgy 750, paralysis 127 and encephalopathy 72 cases. He carefully described the primary effects of exposure and absorption of lead dust by the respiratory and digestive organs. The first characteristic manifestation is the leaden discoloration of the teeth and gums. He explained that this was due to sulfureted hydrogen evolved in the mouth combining with the circulating lead in the tissues. Priority for the recognition of this sign is due him and not to Burton. Another commonly

described effect is the lead taste, breath and odor. The third item was lead jaundice, the results of the accumulation and absorption of great quantities of lead particles which produce this earthy yellow color of the skin and tissues. The fourth is lead emaciation.

He cites the various names given in the past by authors regarding this oldest occupational disease such as plumbism, saturnism, huttenkatze and colica pictonum. He well portrayed how lead is disseminated in the atmosphere as fine particles and how emanations inhaled or swallowed are absorbed by the mucous membrane, transformed into oxides or salts that produce the lead diseases. He was definitely satisfied that lead colic is not produced by cutaneous absorption. As to the 1,217 cases of lead colic observed, every individual had an occupational history as a worker in lead. The principal ones were red and white lead makers, painters, grinders, potters, type and bronze workers. He devoted a chapter to predispositions such as season, climate, age, sex, cleanliness, etc., and another to precursors of the phenomena of primary effects that precede lead colic.

Lead Colic

Beginning with lead colic, he devoted chapters to definitions, synonyms, history, causes, predispositions, precursors, symptoms, complications, progress, diagnosis, chemistry, seat and nature, and last, treatment. The other three lead diseases were likewise arranged.

The symptoms of lead colic, as is implied, are severe pain principally located about the umbilicus, often in the epi- or hypogastrium, of a violent, moderate or light degree. He mentioned that the rigidity and depression of the abdomen and the relief of the colic pain by pressure is achieved in seven out of 10 cases. The nausea and vomiting, the contractions of the anus and rectum, borborygmus, hiccough, characteristic breath, saliva, metallic taste and jaundice are familiar symptoms.

In the differential diagnosis of other diseases of the digestive organs, provided by such metallic poisons as copper, mercury and arsenic, he described how the symptoms differ from those of lead action, also of such pathological conditions as ileus, peritonitis, nephritic and hepatic colic. Tanquerel performed postmortems on each of the 49 patients who died of lead colic. There were found no alterations in the digestive tube and only traces of congestion. Such pathologists as Merat, Orfila, Grisolle and Dehaen concur in that they had not been able to discover the slightest traces of inflammation in patients who have died of lead colic. It was Tanquerel's opinion that the seat and nature of lead colic is in the great sympathetics and nowhere else.

Lead Arthralgy

Lead arthralgy is credited to an affection of a neuralgic nature produced by lead and characterized by lively pain in the limbs, lacking redness or swelling, diminished by pressure and increased by motion. It is accompanied by various difficulties, such as cramps, hardness and tension of the painful parts. Next to colic it is the most frequent effect. Lead arthralgy usually accompanied colic, paralysis and encephalopathy in Tanquerel's cases.

He defined paralysis in general as the loss or weakness of voluntary motions and sensibility, or of one of these faculties only. One of these states he termed paralysis and to the other he gave the name of lead anesthesia. Tanquerel made the statement that lead workers most frequently attacked with paralysis are those confined in an atmosphere contaminated by lead emanations. Forty of 108 cases did not have a preliminary colic. Certain symptoms give notice of the approach of lead paralysis: lassitude, trembling, weight loss and coldness. Ninety-seven cases were affected in the upper extremities, mostly in the wrist, forearm and fingers. In 15 cases, paralysis developed in the thigh, leg, foot or toes. A few cases showed paralysis of the intercostals and vocal cords. Paralysis is one of the gravest diseases caused by lead. Of those who died, the autopsy findings, as to the appearance of the cord, spinal marrow and muscles, revealed no evidence of anatomical alterations which would account for the phenomena of the disease. The muscles most frequently deprived of motion are found in the extensors of the limbs. No morbid phenomena have been observed in the central nervous system; which indicates the existence of an organic lesion as the origin of lead paralysis.

Lead Encephalopathy

Lead encephalopathy was known first by Dioscorides, the Greek physician of the first century A. D., who mentioned the delirium produced by lead. Symptoms came on suddenly, with violent cephalalgia, often limited to the forehead, usually accompanied by vertigo or amaurosis and pains in the orbits. Different functional derangements of the brain such as delirium, coma and convulsive forms frequently developed. Of this series of 72 cases, 16 died. At the autopsy there was found a flattening, a shrinking of the cerebral convolutions with increase or diminution of cohesion of the cerebral pulp.

Tanquerel recognized the value of chemical analysis by availing himself of the services of Devergie and Guibort who detected a notable quantity of lead in the brain tissues in encephalo-

pathy. Subsequently, Devergie in 1836 detected copper and lead in normal human organs. This was confirmed by Orfila, the Parisian toxicologist. Professor M. D. Chevreul, the father of organic chemistry, pointed out as early as 1824 the existence of copper and lead in the human body as normal elements. This finding is of the greatest importance in legal medicine.

Prevention and Treatment

The final chapter of this great work is devoted to the prevention of lead disease by hygienic measures, both personal and environmental. He especially emphasized avoiding inhalation and ingestion of lead emanations. He stressed personal cleanliness by baths, washing before eating, by mouth hygiene and clean clothing. He also developed a respirator in which a dampened sponge fitted over the nose and mouth. He pro-

moted clean working places, good ventilation and wet processes to avoid dust. As for therapy, he had no specific, only symptomatic methods. He discredited the use of the popular sulphuric acid lemonade, extensively used at that time.

Tanquerel des Planches' immortal books on lead diseases earn for this astute clinician and investigator a foremost place in industrial medical history.

Since few copies of Tanquerel's book on lead poisoning are available anywhere, it is noted that these were translated into English in 1848 by Samuel L. Dana, M.D. under the title *Lead Diseases*. This same book contains the results of Dana's own investigation of lead poisoning from lead plumbing. This Dana publication is almost as rare as the Tanquerel volumes, but at least the American readers possess the virtue of having a good translation into English.

Occupational Cancer

Repeated sunburn is perhaps the most widespread of the known causes of cancer.

"The belief that nothing is known about the causes of cancer is as mistaken as it is universal," says Charles S. Cameron, M.D., former medical and scientific director of the American Cancer Society.

"A great deal is known," he continued, referring to certain circumstances or agents which appear to favor the development of cancer. "Although we do not know how or why."

"Sunburn, for instance," he remarked. "The connection between the disease and sunlight is so striking that long ago cancer of the skin was dubbed 'sailor's cancer' or 'farmer's cancer'."

A large number of rats, in an experiment, placed in the sun for several hours a day over a period of months became cancerous. Nine out of 10 developed cancer of the skin and always in areas that were exposed and sparse in hair.

"Very fair-skinned people in particular must be careful," warned Dr. Cameron.

He also mentioned other suspects that contribute to the danger of cancer. "Modern men and women who live in cities inhale a rich variety of smoke, dust and fumes. Roads and streets are covered with asphalt which is chemically related to substances that are known to cause cancer," Dr. Cameron said.

Occupational hazards such as those that exist if a human being is working with dyes, arsenic, tar, creosote oil, crude paraffin oil, x-ray and radium, can, if the contact is long enough and intense enough, result in skin cancer.

It must be remembered, Dr. Cameron stated, that these agents are dangerous in causing occupational cancer when the form and amount handled are taken into consideration.

"Finally," Dr. Cameron said, "the known and suspected causes of cancer do not account for the majority of cancer cases. Evidently a more basic cause lies within the living organism itself. The nature of susceptibility is unknown but it is the core of the cancer problem."

—From *Whittier (Calif.) News*, July 1, 1959.

A
Hote
of t
geon
nois.
G.
Loui
Loui
Brov
R
FRC
Can.
Clin
E
fess
Med
W
Ass-
Uni
J.
fess
Mec
pita
C
thir
in
will
not
yea
wit
pro
ule
I
the
pro
fro
tha
rec
ties
hir
If
res