UNIVERSIDAD NACIONAL DEL CUZCO

LEYES GENETICAS DE LOS ELEMENTOS QUIMICOS. NUEVO SISTEMA PERIODICO

Por

OSWALDO BACA MENDOZA

CUZCO—PERU

NOTA: El lector puede visitar las siguientes páginas elaboradas por el Ing. Julio A. Gutiérrez Samanez

http://oswaldo-baca-mendoza.blogspot.com/2008/06/oswaldo-baca-mendoza-el-centenario-de.html

http://www.youtube.com/watch?v=YAecg9D_1As

http://www.youtube.com/watch?v=EHFpuzP8NGM

http://www.youtube.com/watch?v=0BBPQX3CySA

- NUEVO SISTEMA PERIODICO DE LOS ELEMENTOS

Por el Profesor Oswaldo Baca Mendoza
Universidad Nacional del Cuzco CUZCO-PERU-1953

PRIMER BINODO

SEGUNDO BINODO

TERCER BINODO

CUARTO BINODO

H	He							
		Li	Be	B	C	N	O	F
Ne	Na	Mg	Al	Si	P	S	Cl	
Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br
Kr	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I
Xe	Cs	Ba	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At
Rn	Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf

Ley de Periodos $Z = K + [1 (n)]$

Ley de Grupos $Zg = Z + [2 (0 + 2^1 + 2^1 + 3^1 + 3^1 + 4^1 + 4^1 + 5^1 + 5^1 + \ldots)]$

Ley de Limitación de Periodos: $P = 2 (2^1, 2^2, 3^1, 3^2, 4^1, 4^2, 5^1, 5^2, \ldots)$

GENETIC LAWS OF THE CHEMICAL ELEMENTS A NEW PERIODIC SYSTEM.

WORK PRESENTED TO THE "FIRST SECTION:

PHYSICALCHEMISTRY AND ELECTROCHEMISTRY"

OF THE FOURTH PERUVIAN CONGRESS OF CHEMISTRY"

By OSWALDO BACA MENDOZA

Lima, (Perú) october, 1953.

CONTRIBUTION FROM THE "SECCION CIENCIAS QUIMICAS DE LA UNIVERSIDAD NACIONAL DEL CUZCO".

CUZCO, PERU

October, 1953.

CORRECTIONS TO THE PRESENT ISSUE OF "GENETIC LAWS OF THE CHEMICAL ELEMENTS.— A NEW PERIODIC SYSTEM".

Page.	Line.	It says:	It should say:
27	12	Otober	October
29	8	and son on	and so on
29	11	for this is	for this law is
29	—5	and themselves	and among themselves
32	2	stage	stages
32	11	probable,	probably,
32	13	this elements	these elements
32	23	affered	offered
33	22	that exist.	exist.
34	2	reborn elements.	reborn elements. (Chart Nº 2)
34	11	This	These
34	15	Thirly.—	Third.—
34	17	a unique	an unique
34	—5	ha discovered	has discovered
34	26, 27	unknown elements.	unknown elements in their respective stages of evolution.
35	at the bottom note	from tre Latin	of the Latin
36	27	17Lu.	71Lu.
36	27,28	and beginning with number 90Th compose the "Actinide Series".	beginning with number 90Th and ending with number 103, constitute the "Actinide Series".
37	12	all which	al of which
27	20	a limited	a limit
37	—9	apper	appears
37	—10	Similiarly	Similarly
37	—12	satege	stage
38	—3	those number	this number
38	—14—15	echeloned groups families	echeloned groups, families
39	19	a pair the element	a pair with the element
39	24	pairing with	paired with
39	27	pair 139—159.	pair 139—189.
40	4	propose	proposes
40	12	protons each	protons for each
40	22	bring forth	brings forth
41	—13	(lanthanide and actinide groups)	(lanthanides and actinides)
41	4	han	has
41	13	thirth	third
41	14	fourt	fourth
41	—2	had been an are	had been and are
41	—14	actaves,	octaves,
42	9	of binod,	of each binod,
42	20	laws the study	laws and the study
42	—6	andvantages	advantages

GENETIC LAWS OF THE CHEMICAL ELEMENTS.

A NEW PERIODIC SYSTEM (1)

By OSWALDO BACA MENDOZA

DEDICATED:

> With acknowledgement to the "UNIVERSIDAD CENTRAL DE MADRID" (SPAIN) for its assistence and sincere devotion to my post-graduate studies in its Faculty of Chemistry (1934-1936).
>
> To the memory of my teacher Dr. Don Angel del Campo y Cerdán, Illustrious Professor of Analytical Chemistry at the Universidad Central de Madrid (Spain).
>
> **The Author.**
>
> "Universidad Nacional del Cuzco". Cuzco, Perú. Otober, 1953.

INTRODUCTION.—All the investigations that have been carried out on the classification of elements are stages of advancement in the quest for the reason or fundamental causes relative to the production and relations of such elements.

These genetic causes are to be found, undoubtedly, in the behaviour of the most minute components of matter.

The interactions of components manifest itself in the formation of matter such as: nuclei and atoms. These in turn generate molecules, macromolecules and in general all the infinite variety of small and large inorganic, organic and organized bodies.

It is for this reason that the complete explanation of the properties of any combination of matter has to be given on the basis of the **interactions of all their components**. This explanation, regarding the elements, was anticipated by Angel del Campo y Cerdán in the following statement:

"**The properties of the elements seem to be simultaneously a periodic funtion of the masses of their atoms and the electric charge of their nuclei, that is, of the atomic masses and the atomic numbers**" (2).

Using this statement as a guide and by observing the autodynamism of matter, the author, in his quest for the genetic reason of the atoms, has discovered certain **quantitative expressions of the protons**. Expressions that certainly correspond to the formation, development and evolution of the nuclei, atoms and consequently of the elements.

Although they could be classified as rules, since they refer to aspects and precise general correlations of the protons, it is proposed to classiffy them as **genetic laws**, and, since it is possible to predict a great number of facts by means of these expressions.

LAWS.—The interactions of protons, with themselves, with neutrons, (probably also with waves) and other manifestations of matter, produce nuclei, atoms and elements. Consequently the following general statement can be made:

Each quantity of protons, is the origen of generations of nuclei, atoms and elements.

These generations are produced in different ways, that is following different genetic lines regulated by their own laws.

One of these genetic lines is the successive formation of inmediate nuclei (atoms and elements) according to a law of infinite series that can be expressed by means of

$$Z = K + [I(n)] \qquad (I)$$

In which: **K**, is the constant initial quantity of protons; **n**, successive quantities also of protons; and **Z**, the total resultant quantity of the combined protons (quantity that among other properties determines the atomic number).

If **K**, is equal to 1, and **n** takes values 0, 1, 2, 3, 4, ...

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(2) Angel del Campo y Cerdán, "La Evolución del Sistema Periódico de los Elementos"., Real Academia de Ciencias Exactas, Físicas y Naturales., Madrid, junio de 1927. — Imp. A. Medina (Suc. de J. Peláez), Toledo, 1927., pág. 75.

the resultant values of these **protonic agrupations** (nuclei), that is the values of **Z** will be 1, 2, 3, 4, 5, ...; exactly the atomic numbers of elements known and unknown. All these formations **start from a single proton;** that is to say beginning with the Hydrogen.

If **K,** is equal to 2, and **n** equal to 0, 1, 2, 3, 4, ... the values of Z will be 2, 3, 4, 5, 6, ... that is, nuclei will be formed beginning with **two** original protons (starting from Helium).

And son on for **each original value of K.** ....

This law corresponding to the combined quantities of protons that go into the inmediate and successive formation of nuclei is given by equation (I).

The name proposed for this is **Law of Inmediate Formations or Law of Periods (3.**

Another genetic line is the formation of nuclei (atoms and elements) that are not inmediate, according to a law of infinite series that the author has discovered. This law is expressed by

$$Zg = Z + [2(0 + 2^2 + 2^2 + 3^2 + 3^2 + 4^2 + 4^2 + 5^2 + 5^2 .....)] \quad (II)$$

Where: **Z,** is the quantity of protons of the original-nucleus; and **Zg,** in each stage of genetic line (each term of the series), is the quantity of protons corresponding to the nucleus (atom and element) derived from the said origin. Or in other words, **Zg,** is the group atomic number for each and all of the elements that are derived from the initial element and whose atomic number is **Z.** Consequently, the protons of each nucleus constitutes a quantity that is the origin of formation of other different nuclei which are linked genetically to the former and themselves accordin to law II.

As it is already suggested, this law governs **formations of groups of elements,** and for this reason the author proposes the name **Law of Groups.**

According to this law each group of elements is formed beginning with a **Z.** Applying we have:

_____

(3) This law has been used uncompletely in the past, only as a rule, in the form of Z = n (atomic number equal to the number of protons). Such form doest not correspond to the genetic meaning in itself; in turn, the form that it is given now is closser to that meaning and exhibits its character as a law.

1) **Z equal to 1, then**
    the values of Zg: 1, 9, 17, 35, 53, 85, 117, 167, 217, ...
    are exactly the
    atomic numbers of: H, F, Cl, Br, I, At, Unk, Unk, Unk, ...

2) **Z equal to 2, then**
    the values of Zg: 2, 10, 18, 36, 54, 86, 118, 168, 218, ...
    are the atomic
    numbers of: He, Ne, A, Kr, Xe, Rn, Unk, Unk, Unk, ...

3) **Z equal to 3, then**
    the values of Zg: 3, 11, 19, 37, 55, 87, 119, 169, 219, ...
    are the ato-
    mic numbers of: Li, Na, K, Rb, Cs, Fr, Unk, Unk, Unk, ...

4) **Z equal to 4, then**
    Zg: 4, 12, 20, 38, 56, 88, 120, 170, 220, ...
    are the atomic
    numbers of: Be, Mg, Ca, Sr, Ba, Ra, Unk, Unk, Unk, ...

5) **Z equal to 5, then**
    Zg: 5, 13, 21, 39, 57, 89, 121, 171, 221, ...
    are the atomic
    numbers of: B, Al, Sc, Y, La, Ac, Unk, Unk, Unk, ...

6) **Z equal to 6 then**
    Zg: 6, 14, 22, 40, 58, 90, 122, 172, 222, ...
    are the ato-
    mic numbers of: C, Si, Ti, Zr, Ce, Th, Unk, Unk, Unk, ...

7) **Z equal to 7, then**
    Zg: 7, 15, 23, 41, 59, 91, 123, 173, 223, ...
    are the ato-
    mic numbers of N, P, V, Cb, Pr, Pa, Unk, Unk, Unk, ...

8) **Z equal to 8, then**
    Zg: 8, 16, 24, 42, 60, 92, 124, 174, 224, ...
    are the ato-
    mic numbers of: O, S, Cr, Mo, Nd, U, Unk, Unk, Unk, ...

9) **Z equal to 9, then**
    Zg: 9, 17, 25, 43, 61, 93, 125, 175, 225, ...
    are the ato-
    mic numbers of: F, Cl, Mn, Tc, Pm, Np, Unk, Unk, Unk, ...

10) **Z equal to 10, then**
    Zg: 10, 18, 26, 44, 62, 94, 126, 176, 226, ...
    are the ato-
    mic numbers of: Ne, A, Fe, Ru, Sm, Pu, Unk, Unk, Unk, ...

11) **Z equal to 11, then**
    Zg: 11, 19, 27, 45, 63, 95, 127, 177, 227, ...
    are the ato-
    mic numbers of: Na, K, Co, Rh, Eu, Am, Unk, Unk, Unk, ...

12) **Z equal to 12, then**
    Zg: 12, 20, 28, 46, 64, 96, 128, 178, 228, ...
    are the ato-
    mic numbers of: Mg, Ca, Ni, Pd, Gd, Cm, Unk, Unk, Unk,(4)....................

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(4) Unk, unknown.

And so on, on the basis of any value of **Z** (origin) we shall obtain the different values of **Zg**. Therefore, as a resultant, the Groups of each and of all the elements will be determined by means of the atomic numbers (5).

This law of agrupation is unlimited. By means of this law we see the great regularity of successions that there is within the groups and among the groups. This Law, on assembling the elements in groups, shows the genetic relations that exist among them.

A NEW PERIODIC SYSTEM

Let us place in a line (horizontal, for instance) the atomic numbers obtained with $Z = K + [1(n)]$ when **K** is equal to 1. On each atomic number let us make function the law

$$Zg = Z + [2(0 + 2^2 + 2^2 + 3^2 + 3^2 + 4^2 + 4^2 + 5^2 + 5^2 \ldots \ldots)]$$

and then let us place in vertical lines the resultant atomic numbers of the groups (with their respective symbols in case of known elements).

We shall then readily obtain an arrangement of nuclei, atoms and elements. This arrangement constitutes a **New Periodic System.**

With the same two laws we can go on arranging for initial values of zero (Z equal zero) and less than zero. Then by reuniting the resulting values into a continuous spectrum we shall find that they are two fields, **two worlds** that constitute **a unit.** Due to the above mentioned laws of their own, they form a **unique natural system** which is so ample that it is composed of fields, zones, parts, etc., with their original positive and negative numbers. These worlds are genetically linked and evolutively limited. This system is presented in chart number 1.

By means of this arrangement (chart Nº 1) we see that the formation, development and evolution of the nuclei, atoms and elements begin, in principle (in origin) **from a proton** (6) in the world of the negative original numbers and convert themselves later into positive ones, and proceed in the world of the original positive numbers.

These are processes in which nuclei, atoms and elements are transformed continually and by leaps in up grade, going in this way from one into another, from one world to another, and, in general, from one genetic line to another genetic line.

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(5) To find out readily the values of Zg, one can be determined once and forever the products of each one of the successive sums of the series. These fixed products added one after one to the designated atomic numbers (Z) as original quantities will produce the values of Zg.

(6) According to the genial assumption of Prout that "all elements come from Hydrógen".

As a boundary line between the two worlds we can determine one of the evolutionary stage that exist among them. This stage could be the genetic line of the RARE GASES group (with both known and unknown elements). As such a boundary line we could select the vertical line of the original atomic number zero (that of the neutron); or that of the original atomic number 1 (that of the Hydrogen). But, that of the neutron can not be a boundary line, because, in reality the quantitative variations of the neutron do not originate formation of different elements as that of the proton. Nor does the Hydrogen line seem acceptable because this element, and its family group, have very active properties. And, the transition line between the two worlds, probable, has to correspond to a stage of great equilibrium, neutrality or inactivity. This genetic line would be the one formed by Helium, that is to say by the line of Rare Gases. In this way this elements will constitute the **end of a world** and the **beginning of another.**

To the world that is situated beyond this line we can call the **world of the negative original numbers** (as it has been called up to now) or **negative protonic field** or **Hydrogen World.**

In this world, all the period genetic lines begin with Hydrogen. And, according to the laws we have mentioned, they periodically form a "Rare Gas" in a determined stage of their development. There is a single transition stage for a given vertical line in which each and all the period genetic lines form Rare Gases. These elements produced in this way can contitute the boundary line already affered for consideration (7).

This boundary line also shows that Hydrogen belongs to that world; and this could have been the reason for the difficulty in the proper placing of this element in most of the former classifications.

The world situated in the same genetic line and closer to the "Rare Gases" could be called **positive protonic field** or **Helium World.**

FORMATIONS.—In the arrangement wherein we obtained, the formations of elements in horizontal genetic lines (in each world or in both together and according to Law I) can be called **Periods,** Accordingly, the formations in vertical genetic lines, as stated by Law II, can be named **Vertical Groups** (8, 9).

HYDROGEN WORLD.—The Hydrogen Field or Hydrogen World, fundamentally has been deduced essentially by the action of the Law of Groups. As it has already been mentioned this world and that of Helium constitute a unit. Probably both of them constitute a double facet of the same reality.

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(7) Boundary line, could also be chosen such as the vertical group of the "Alcaline Metals". In general the genetic line that is most convenient.

(8) The terms "Period" and "Group" have long been used with a meaning that is slightly different from the the sense that is given now to them.

(9) There are other "formations" that we shall see later.

In this World of Hydrogen the original negative numbers involve, possibly, signification of trascendental facts such as transmutations.

It may be that they have to deal with the conversion of neutrons to protons, or with the condensation of negative material corpuscles and its conversion to positive corpuscles.

(For the time being we will set aside the study of this world).

HELIUM WORLD

Supposing we demarcate as a boundary the genetic line of Rare Gases, thus representing the Helium World as indicated in chart number 2. In this chart we place Hydrogen as the linking element of the two worlds.

Periods.—In this world, each period begins with a Rade Gas and can take the name of this gas or an ordinal number. In this way we could say the Helium or first period; Neon or second period, etc. Then we shall have as many periods as rare gases exist.

Vertical Groups.—Each vertical group begins with the atom whose protons constitute the original quantity of the group, that is to say with the element whose Z is the origin in the course of the Law of Groups. Each group can take the name or the atomic number of the initial element or the name of another element belonging to their group. In this way, we could say Lithium group or group 3; Silicon group or group 14, or, still in better way, Zin group or group 30; etc., etc. Actually there will be as many vertical groups as elements that exist.

FORMATION OF ELEMENTS.—The study of this world allow us to predict:

First.—As a function of proton quantity, the formation of nuclei, atoms and elements is unlimited in periods and in groups. There is an illimitability that is already shown in the respective laws (Law of Periods and Law of Groups).

Second.—In the course of the same laws, an element can be formed by different quantities of original protons; that is to say, nuclei, atoms and elements that were already **formed in former generations** can also be **reformed (that is they can reapper) in later generations.** For instance, according to Law I, Carbon can be formed beginning from the original quantity 1, when K is equal to 1 and n is equel to 5; or when K is equal to 2 and n is equal to 4; or when K is equal to 3 and n is equal to 3.

According to Law II, Rubidium (for example) can be formed beginning fron the initial quantity of 3 protons or 21, because when:

Z is aquel to 3, the fourth term of Zg is 37 (Rb);
Z is equal to 21, the third term of Zg is 37 (Rb).
And so on for other elements.

The first formations can be named **primordial** or **primigenial** where-as the later creations are **secondary formations** or **reborn elements**.

In the Helium World the secondary formations begin in the:

1st period with the element Z equal to 10.
2nd " " " " Z " " 18.
3rd " " " " Z " " 36.
4th " " " " Z " " 54.
5th " " " " Z " " 86.
6th " " " " Z " " 118.
Etc., etc.

This secondary formations are also quantitative coincidences of the inter-relations of the two above mentioned laws.

As can be seen in chart number 2, the secondary formations begin in the same vertical line (the same group) for each pair of periods.

Thirdly.—The primigenial elements (primordial elements) on one side and the secondary elements on another side constitute **two great echeloned and harmonic zones**. Zones that integrate forming a unique unit, showing in this way that each horizontal genetic line in itself, is an unlimited period.

Fourth.—In all the Helium World we can already observe remarkable periodic and gradual analogies in the periods as well as in the groups.

ZONE OF THE PRIMIGENIAL ELEMENTS (OR PRIMORDIAL ELE-MENTS).—Omitting for the moment the secondary elements we obtain the zone of the primigenial elements. This zone, indicated in chart number 3, is limited in periods but always unlimited in groups. References to this chart 3 will indicate the **echeloned location** in which all the known nuclei (atoms and elements) are situated or predict a location for the yet unknown elements.

By omitting the secondary elements, the periods have automatically been limited. This limitation is due to another law that we shall state later.

LAW OF THE LIMITATION OF PERIODS.—As it has already been seen, the isolated action of the laws of periods and groups predict an unlimited number of elements, but mutual **interactions** causes this number to **be limited in each period.**

The author ha discovered the law of this limitation which we can state as follows:

Each period has a determined number of pertaining elements

And its mathematical expression is:

$$P = 2\,(2^2, 2^2, 3^2, 3^2, 4^2, 4^2, 5^2, 5^2, 6^2, 6^2 \ldots\ldots) \qquad \text{(III)}$$

Where **P,** is the total number of pertaining elements in each period. This is equal to the product of 2 by the square of each term. According to this expresión we have the following number of elements in each period:

1st period	....	8 elements.
2nd "	....	8 "
3rd "	....	18 "
4th "	....	18 "
5th "	....	32 "
6th "	....	32 "
7th "	....	50 "
8th "	....	50 "
Etc., etc.		

OTHER FORMATIONS.—

A) **PAIRED PERIODS.**—The limitations indicate that the periods are paired; that is, pairs of successive periods have equal number of elements.

The word **BINODS,** has been coined as a name for these **pairs of periods.** (In singular, Binod, for one pair of periods) (10).

According to the above mentioned concepts an unlimited number of Binods could exist. At present as may be observed in chart 3, only five Binods have been expressed. The first and second Binods are complete relative to their atomic numbers and respective elements. The third Binod is complete as to atomic numbers but 17 elements are unknown (taking in consideration now, october 1953, that California, that is number 98 is the last discovered element).

The fourth and fifth Binods, with their determined atomic numbers, are offered as an example of the **continuity of the system and the accuracy in the determination and location of atomic numbers, limitation of periods, illimitability of groups,** etc., etc.

B) **ECHELONED GROUPS.**—The Law of Limitation of Periods causes the homologous elements to appear in **echeloned arrangement.** These formations we shall call Echeloned Groups.

Each one of these groups is constituted by pairs of elements of all the binods. In this way, the following echeloned groups appear:

a)	F-Cl,	Br-I,	At-117,	167-217	....
b)	O-S,	Se-Te,	Po-116,	166-216	....
c)	N-P,	As-Sb,	Bi-115,	165-215	....
d)	C-si,	Ge-Sn,	Pb-114,	164-214	....
e)	B-Al,	Ga-In,	Tl-113,	163-213	....

(10) Binods, composed from tre Latin word "Bino", Binus' that means pair, and the letters "ds" by apherisis of the word "periods".

and still

 f) Be-Mg, Zn-Cd, Hg-112, 162-212 ....

 g) Li-Na, Cu-Ag, Au-111, 161-211 ....

 h) He-Ne, Ni-Pd, Pt-110, 160-210 ....

C) TRANSITION ELEMENTS. — RARE EARTHS.—The quantitative inter-relations of the genetic laws allows a determination of the significative differences that exist among the elements of successive binods. Thus we have:

 First binod .... 8 pairs of elements.
 Second " .... 18 " " "

          ————————————————

     Difference ..... 10 pairs of elements.

These 10 pairs are precisely the so called "Transition elements". As can be seen in chart 3 the birth of such elements of transition is closeley related with the formation of echeloned groups. These ten pairs of elements are situated in the second binod, between the vertical groups of Boron and Germanium, and they are successive pairs

   22Ti-40Zr .... 31Ga-49In.

These ten pairs constitute a remarkable family, with very special characteristics; and are resultants of the quantitative differences between the first and second binods.

Proceeding, we note that:

 Second binod .... 18 pairs of elements.
 Third " .... 32 " " "

          ————————————————

     Difference ..... 14 pairs of elements.

of these 14 pairs, the 14 elements alone of the fifth period are the so called "Rare earth metals", that form a family that is also called the "Lanthanide series", which begins with element 58Ce and ends with number 17Lu. The other 14 elements, which form pairs with the former and beginning with number 90Th compose the "Actinide series".

The proposed New Periodic System automatically locates the second series of "Rare earth metals" that was already predicted by J. Perrin and supported afterwards by other investigators. (11, 12, 13).

(11) G. E. Villar, J. of Chem. Educ. 19,289. — Id., id., 19,329. (1942).
(12) G. E. Villar, Bull, Facult. Ing., Montevideo, 11, Nº 7, p. 14 (1944).
(13) J. Hardwick, Natl. Research Council, Chalk River, Ont.); Proc. Com. Nuclear Chemistry., Chem. Inst. Can. (Otawa), 44-45 (1947). Refered in C. A., 3253a, 40, (1948).

These 14 pairs are **formations or associations** generated in great stages of the general evolutive march of the elements. They do not constitute an excepcional case but rather a general one. These are stages where remarkable properties should appear.

Going on with the determination of differences we find:

Third   binod .... 32 pairs of elements.
Fourth   " .... 50 " " "
_____
Difference ..... 18 pairs of elements.

18 pairs of elements that will constitute another family which will be situated in the fourth binod (7th and 8th periods). This new formation will probable begin with the pair 122-172 .... and will end with the pair 139-189, all which are unknown to date.

And so going on, with the formation of periods, other families of elements (inner paired formations) will appear successively whose numbers will be the difference between the numbers of elements of successive binods. The atomic numbers and the location of those families (inner paired formations) can also be predicted accurately by the New Periodic System.

D) **TRIADS.**—As each element is a stage of evolution, successive elements constitute related stages that are continually increasing until they reach a limited and are transformed in other stages. In this way the formations called "diads", "triads", "tetrads" as well as the "transition formation", "rare earth metals" etc., are also stages of evolution; and, as such they show and do present clase likenesses among their elements and also have remarkable differences with others.

The formations called "triads" are remarkable. They also appear in pairs in the second and third binods and continue appearing in the sucessive ones. Within the binods, the "triads" are transition stages to the last complete stages formed by **seven pairs of active elements;** great stages that always end in a final pair of halogens. These locations can accurately be determined. Thus in the second binod we have the last satege 29Cu-47Ag .... 35Br-53 I, and exactly, anticipating this formation, is the paired triad 26Fe-44Ru, 27Co-45Rh, 28-Ni-46Pd. Similarly in the third binod there apper the paired triad 76Os-108, 77Ir-109, 78Pt-110. In the fourth binod the "triad" will be constituted by the paired elements of atomic numbers 158-208, 159-209, 160-210. And so on.

PROPERTIES.—The properties of the nuclei, atoms and elements (as in all material formation) are manifestations of the **inter-actions** of their components, These interactions cause processes of development and evolution of the formations we have pointed out.

In each element (as in each formation) these processes are operating successively and gradually until they reach a certain limit, at which point,

there suddenly occurs new processes originating the apparition of a new element, that is a new formation.

As these processes happen periodically and progressively in each stage of evolution (in each plane), the properties of the nuclei, atoms and elements will also appear periodically and progressively.

The discovered laws also indicate that the periodicity and progressiveness of properties are operative in different ways but simultaneously in the different genetic lines and their relations. We then come to the conclusion that: Among the complex interaction processes (between the components) are the processes that appears periodically and progressively, differently and simultaneously; processes that constitute the specific and general properties of the nuclei, atoms and elements. As the New Periodic System is an expression of these laws, it shows the genetic relations of the elements in progressive and periodic course, and allows us to explain with accuracy the likenesses and differences, the general and specific properties of the same (14).

Everything expounded so far can be resumed in the following statement:

The properties of the chemical elements are periodic and progressive.

PREDICTIONS.—The discovered laws permit us to predict:

a) The existences of periods, binods, vertical groups, echeloned groups families of transition elements, pairs of elements, triads, etc. etc., in general, they permit predictions of formations: nuclei, atoms and elements, and their inter-relations.

b) The number of elements of each period, of each binod. For instance, according to the Law of Limitation of Periods (law III) there will be 50 elements in the seventh period and equal number in the eighth, so that the two will form a binod (the fourth binod). In the ninth and ten periods, that is in the fifth binod, there will be 72 pairs of elements. And so on progressively according to the above mentioned law.

c) The number of elements of each **inner formation**; that is the number of elements in the great evolution steps within each binod. For example, in the fourth binod, those number has to be 18 pairs, because the numerical difference between the third and fourth binods is 18 pairs, according the same Law of Limitation of Periods.

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(14) For instance, it will be possible to explain the chemical variations (discovered experimentally) that display the elements of the so called "major groups" or "long periods" (in the former classifications). Those variations had no explanation; they were considered as exceptional facts. Not long ago, R. T. Sanderson demostrated that they were not exceptional facts and that they are explainable on the basis of electronegativities. (J. Am Chem. Soc., 74, 4792, 1952). This explanation is in full accordance with the one that is predicted by the New Periodic System.

d) All the atomic numbers (quantities of protons) of all the elements that will integrate the periods and binods.

e) The atomic numbers of the elements that form each vertical group. Thus, according to the Law of Groups (Law II), the vertical group that has to begin with the primary element of atomic number 150, of the seven period, (a group that begin with the secondary element of Z equal 34, chart 2) has to be composed of the primordial elements of atomic numbers 150, 200, 250, 322, 394, 492, etc. etc.

f) The atomic numbers of elements still unknown but that they have to belong to the already existing groups. For example, the unknown elements of the vertical group of the Rare Gases, that is the elements following Radon will belong to the atomic numbers 118, 168, 218, 290, 362, 460, etc. etc.

g) The group and period to which an element of a given atomic number will belong, For instance, to which group and period will belong the element of atomic number 132 ?. Applying the Laws, or simply looking at the New Chart, we find that this element has to be situated in group 32 (that is in the vertical group that begins with the Germanium), and in the seventh period. In addition, the said element will belong to the fourth binod, and will form a pair the element of atomic number 182; therefore, these two elements will have similar properties; and will also exhibit the general properties of the group.

h) Locations, not only of elements but also, of **formations**. For instance, in the third binod the elements of the Osmium triad 76Os, 77Ir, 78Pt will be completed, located and pairing with 108, 109 and 110 respectively.

Another example, the 18 pairs of elements that constitute the inner formation of the fourth binod will be located beginning with the paired atomic numbers 122-172 and will end with the pair 139-159.

In general, the three discovered laws, whose function produce the ample and **natural system** proposed, also permit the prediction of qualitative and quantitative facts and phenomena corresponding to nuclei, atoms and elements known and unknown. In addition, they also allow confirmations and generalizations of many known facts.

SUMMARY.—

1) The formations, developments and evolutions of the nuclei, atoms and elements depend upon the **inter-actions** of the protons themselves, with the neutrons and other manifestations of the matter (probably with waves also).

2) Each quantity of protons is the origen of generations of nuclei, atoms and elements. (Origen of genetic lines).

3) One of these genetic lines is the successive and inmediate formation of nuclei according to

$$Z = K + [1(n)] \quad (I)$$

where **K**, is the initial and constant quantity of protons; **n,** the successive quantities of protons; and **Z,** the total quantity and resultant of the combined protons (quantity that among other properties determines the atomic number). For this law, the author propose the name of **Law of Inmediate Formations or Law of Periods.**

4) The author has discovered another genetic line and it consists in the **formation of nuclei (atoms and elements) that are not inmediate** according to the infinite series

$$Zg = Z + [2(0 + 2^2 + 2^2 + 3^2 + 3^2 + 4^2 + 4^2 + 5^2 + 5^2 \ldots \ldots)] \quad (II)$$

The name proposed for this is **Law of Groups.** In it **Z,** is the original protonic quantity, that is the atomic number of the nucleus with which the group is initiated; **Zg,** is the total quantity of the combined protons each evolutive stage in the series. In other words, the values of **Zg** are the atomic numbers of each one and all of the elements (nuclei, atoms) of the group that begin with **Z.**

5) The protonic quantities (**Z**) placed in a line (horizontal for instance), according to the Law of Formation of Periods, and the resultant quantities (**Zg**) of the function of Law of Groups on that protonic quantities, placed in another line (vertical for instance), produce a well arranged and unlimited order of parallel groups of known an unknown elements.

6) The functions of the same laws for values (of **Z**) zero and lesser than zero, bringforth another well arranged order of elements.

7) The two orders are **two worlds** (two inmense fields) of elements that constitute a whole and ample New Periodic System. They are **two** worlds genetically linked and differentiated by evolutions (Chart number 1).

8) For the división of this system the author proposes to establish as a boundary line, the vertical line formed by the group of Rare Gases. Then, to the World of original atomic numbers 1 and lesser than 1 we could call **World of the Negative Original Numbers or Negative Protonic World or Hydrogen World.** And to the other world, of original atomic number 2 and greater than 2, we can call **Positive Protonic World or Helium World.**

9) In the present work we shall deal, for the present, with the Helium World (chart Number 2); in it we place Hydrogen as a linkage between the two worlds.

10) In the Helium World, due to the **same nature** of the laws that we have already pointed out and to their **inter-relations,** there are earlier and later formations of the same elements in different genetic lines. To the earlier formations we have called **Primordial Elements or Primigenial Elements,** and, to the later **Secondary Elements (they are Reborn Elements).** These formations constitute two echeloned and reciprocal zones. The formation of the Reborn Elements confine the periods of the Primigenial Elements.

11) The zone of Primigenial Elements is an echeloned system, limited in periods and unlimited in groups; zone in which the nuclei, (atoms and elements) are in their respective planes of evolution.

12) The author han also discovered the law which rules the limitation of periods, which can be stated as follow:

Each period has a determined number of pertaining elements.

And its mathematical expression is:

$$P = 2 \ (2^2, 2^2, 3^2, 3^2, 4^2, 4^2, 5^2, 5^2, 6^2, 6^2 \ldots \ldots) \quad \text{(III)}$$

Where **P**, is the total number of the **pertaining elements** of each period. According to this law there are:

In the first	period	....	8 elements.
" "	second "	....	8 "
" "	thirth "	....	18 "
" "	fourt "	....	18 "
" "	fifth "	....	32 "
" "	sixth "	....	32 "

Etc., etc.

For this expression the name **Law of Limitation of Periods**, has been proposed.

According to this law the **periods** also come **in pairs.** To designate thus in abbreviated form, a pair of periods will be termed BINOD (plural, BINODS).

According to the same law, the elements also come forth in a **new kind** of grouping, which we call **echeloned groups.**

13) The mentioned laws also allow us to explain (in function of protonic quantities) the birth, development and evolution of all formations: nuclei, atoms, elements, triads of elements, actaves, elements of transition, metals of rare earths (lanthanide and actinide groups), vertical groups, echeloned groups, periods, binods, etc., etc. In this way, for instance, the existence of the "transition elements" (ten pairs) is a qualitative and quantitative reason of the **inter-relations** of the first binod (8 pairs of elements) with the second binod (18 pairs of elements). The existence of the "rare earth metals" (there must be 14 pairs) is also another reason of the inter-relations, of the second binod (18 pairs) with the third binod (32 pairs). Etc., etc.

14) The three laws, and the New Periodic System obtained with the same laws, allow us to explain:

a) The properties of the elements.

b) All the formations that up to now seemed anomalous. Formations that had been an are evolutive stages, bonds, of general laws. (For instance the case of rare earth metals).

c) The situation (location) of each element. In general, the location of each formation.

15) With the same laws it is possible to know the course of each one and of all the formations: limited development of periods and binods; unlimited development of groups, etc.

16) These laws and the New Periodic System, allow us to predict:

a) Existences and locations of formations: pairs of elements, triads, octaves, periods, groups, etc., etc.

b) Number of elements of each period, of binod, of each inner formation (within the binods).

c) All the corresponding atomic numbers to the elements that integrate the periods.

d) The atomic numbers of the elements that have to constitute the vertical groups.

e) Properties of elements that are known and unknown.

In general, thes laws that in their functions constitute the Natural Periodic System we have presented, allow us foresee, in a qualitative and quantitative way, facts and phenomena concerning the nuclei, atoms and elements, known and unknown.

17 The applications of these laws the study of the behaviour of the formations allow to state:

The properties of the chemical elements are periodic and progressive.

18) The New Periodic System that is now submitted overcoms all past difficulties, contains all the advantages of the classifications made by Mendeleev, Thomsen, Bohr, Rydberg, del Campo, Seaborg, Catalán, Luder, Coryell, Guzmán, Saz and other investigators.

19) The New Periodic System, Natural and Echeloned, in addition to the scientific usefulness that may offer, presents pedagogical andvantages: such as facility to learn it, to draw it and use it.

CUZCO, PERU.

Oswaldo Baca Mendoza.

5	-4	-3	-2	-1	0n	1H	2He	3Li	4Be	5B	6C	7N	8O
Li	4Be	5B	6C	7N	8O	9F	10Ne	11Na	12Mg	13Al	14Si	15P	16S
Na	12Mg	13Al	14Si	15P	16S	17Cl	18A	19K	20Ca	21Sc	22Ti	23V	24Cr
Cu	30Zn	31Ga	32Ge	33As	34Se	35Br	36Kr	37Rb	38Sr	39Y	40Zr	41Cb	42Mo
Ag	48Cd	49In	50Sn	51Sb	52Te	53 I	54Xe	55Cs	56Ba	57La	58Ce	59Pr	60Nd
Au	80Hg	81Tl	82Pb	83Bi	84Po	85At	86Rn	87Fr	88Ra	89Ac	90Th	91Pa	92U
1	112	113	114	115	116	117	118	119	120	121	122	123	124
1	162	163	164	165	166	167	168	169	170	171	172	173	174
1	212	213	214	215	216	217	218	219	220	221	222	223	224
3	284	285	286	287	288	289	290	291	292	293	294	295	296

CUADRO N° 2   NUEVO   SIS

1H	2He	3Li	4Be	5B	6C	7N	8O	9F	10Ne	11Na	12Mg	13Al	14Si	15P	16
	10 Ne	11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 A	19 K	20 Ca	21 Sc	22 Ti	23 V	24
	18 A	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32
	36 Kr	37 Rb	38 Sr	39 Y	40 Zr	41 Cb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50
	54 Xe	55 Cs	56 Ba	57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68
	86 Rn	87 Fr	88 Ra	89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99	100
	118	119	120	121	122	123	124	125	126	127	128	129	130	131	13
	168	169	170	171	172	173	174	175	176	177	178	179	180	181	18
	218.........														
	290.........														

NUEVO SISTEMA

CUADRO Nº 3

PRIMER BÍNODO

1 H	2 He	3 Li	4 Be	5 B	6 C	7 N	8 O	9 F							
10 Ne	11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl								
18 A	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As
36 Kr	37 Rb	38 Sr	39 Y	40 Zr	41 Cb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb
54 Xe	55 Cs	56 Ba	57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm
86 Rn	87 Fr	88 Ra	89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99	100	101
118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133
168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183
218															
290															

Ley de Periodos: $Z = K + [1(n)]$

- NUEVO SISTEMA PERIODICO DE LOS ELEMENTOS

Por el Profesor: Oswaldo Baca Mendoza

Universidad Nacional del Cuzco. CUZCO-PERU-1953

H	He	Be	Li	B	C	N	O	F	PRIMER BÍNODO
Ne	Na	Mg	Al	Si	P	S	Cl		
Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	SEGUNDO BÍNODO
Kr	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	
Xe	Cs	Ba	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Ti	Pb	Bi	Po	At	TERCER BÍNODO
Rn	Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	...

CUARTO BÍNODO

Ley de Periodos $Z = K + [1(n)]$

Ley de Grupos $Zg = Z + [2 (0 + 2^1 + 2^2 + 3^1 + 3^1 + 4^1 + 4^2 + 5^1 + 5^2 + ...)]$

Ley de Limitación de Periodos: $P = 2 (2^1, 2^2, 3^1, 4^1, 4^2, 5^2, ...)$

NOTA.- A partir de la obra del Dr. Baca Mendoza, el Ing. Julio Gutiérrez Samanez, promotor de esta página ha desarrollado una nueva teoría sobre la Tabla Periódica y la ha publicado en las webs siguientes.

http://video.yahoo.com/watch/3315268
http://www.meta-synthesis.com/webbook/35_pt/pt_database.php?PT_id=313
http://www.monografias.com/trabajos-pdf/tabla-periodica-nuevo-modelo/tabla-periodica-nuevo-modelo.shtml
http://www.meta-synthesis.com/webbook/35_pt/pt_database.php?PT_id=388
http://www.youtube.com/watch_popup?v=f6959WqYcOQ&vq=medium#t=15
Serie del crecimiento de los periodos
http://oeis.org/A001105
Serie binódica de JAGS en: The On-line enciclopedia of Integer Sequences
http://oeis.org/search?q=0%2C+4%2C+16%2C+36%2C+64%2C+100&sort=&language=english&go=Search
http://oeis.org/search?q=0%2C+4%2C+16%2C+36%2C+64%2C+100&sort=&language=english&go=Search

Cusco, Perú, 27 marzo 2011.