

# DONNE DI CO-SCIENZA

29 MARZO 2021

Elena Ugazio

*Dipartimento di Scienza e Tecnologia del Farmaco*



**Rosalind Elsie Franklin**  
**1920 -1958**



*“Tu consideri la scienza (o per lo meno così ne parli) come una sorta di invenzione umana lesiva della morale ed estranea alla vita reale, un’invenzione che va tenuta sotto controllo e collocata fuori della vita quotidiana.*

***Ma la scienza e la vita quotidiana non possono e non dovrebbero essere separate.***

***Per me la scienza fornisce una parziale spiegazione della vita.***

*Per quanto è possibile, la scienza è basata sui fatti, sull’esperienza e la sperimentazione...*

equipment, and to Dr. G. E. R. Deacon and the captain and officers of R.R.S. *Discovery II* for their part in making the observations.

<sup>1</sup>Young, F. B., Gerrard, H., and Jevons, W., *Phil. Mag.*, **40**, 149 (1920).

<sup>2</sup>Longuet-Higgins, M. S., *Mon. Not. Roy. Astron. Soc., Geophys. Supp.*, **5**, 285 (1949).

<sup>3</sup>Von Arx, W. S., Woods Hole Papers in Phys. Oceanog. Meteor., **11** (3) (1950).

<sup>4</sup>Ekman, V. W., *Arkiv. Mat. Astron. Fysik. (Stockholm)*, **2** (11) (1905).

## MOLECULAR STRUCTURE OF NUCLEIC ACIDS

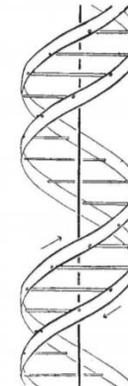
### A Structure for Deoxyribose Nucleic Acid

WE wish to suggest a structure for the salt of deoxyribose nucleic acid (D.N.A.). This structure has novel features which are of considerable biological interest.

A structure for nucleic acid has already been proposed by Pauling and Corey<sup>1</sup>. They kindly made their manuscript available to us in advance of publication. Their model consists of three intertwined chains, with the phosphates near the fibre axis, and the bases on the outside. In our opinion, this structure is unsatisfactory for two reasons: (1) We believe that the material which gives the X-ray diagrams is the salt, not the free acid. Without the acidic hydrogen atoms it is not clear what forces would hold the structure together, especially as the negatively charged phosphates near the axis will repel each other. (2) Some of the van der Waals distances appear to be too small.

Another three-chain structure has also been suggested by Fraser (in the press). In his model the phosphates are on the outside and the bases on the inside, linked together by hydrogen bonds. This structure as described is rather ill-defined, and for this reason we shall not comment on it.

We wish to put forward a radically different structure for the salt of deoxyribose nucleic acid. This structure has two helical chains each coiled round the same axis (see diagram). We have made the usual chemical assumptions, namely, that each chain consists of phosphate diester groups joining  $\beta$ -D-deoxyribofuranose residues with 3',5' linkages. The two chains (but not their bases) are related by a dyad perpendicular to the fibre axis. Both chains follow right-handed helices, but owing to the dyad the sequences of the atoms in the two chains run in opposite directions. Each chain loosely resembles Furberg's<sup>2</sup> model No. 1; that is, the bases are on the inside of the helix and the phosphates on the outside. The configuration of the sugar and the atoms near it is close to Furberg's 'standard configuration', the sugar being roughly perpendicular to the attached base. There



This figure is purely diagrammatic. The two ribbons symbolize the two phosphate-sugar chains, and the horizontal rods the pairs of bases holding the chains together. The vertical line marks the fibre axis.

is a residue on each chain every 3.4 Å. in the z-direction. We have assumed an angle of 36° between adjacent residues in the same chain, so that the structure repeats after 10 residues on each chain, that is, after 34 Å. The distance of a phosphorus atom from the fibre axis is 10 Å. As the phosphates are on the outside, cations have easy access to them.

The structure is an open one, and its water content is rather high. At lower water contents we would expect the bases to tilt so that the structure could become more compact.

The novel feature of the structure is the manner in which the two chains are held together by the purine and pyrimidine bases. The planes of the bases are perpendicular to the fibre axis. They are joined together in pairs, a single base from one chain being hydrogen-bonded to a single base from the other chain, so that the two lie side by side with identical z-co-ordinates. One of the pair must be a purine and the other a pyrimidine for bonding to occur. The hydrogen bonds are made as follows: purine position 1 to pyrimidine position 1; purine position 6 to pyrimidine position 6.

If it is assumed that the bases only occur in the structure in the most plausible tautomeric forms (that is, with the keto rather than the enol configurations) it is found that only specific pairs of bases can bond together. These pairs are: adenine (purine) with thymine (pyrimidine), and guanine (purine) with cytosine (pyrimidine).

In other words, if an adenine forms one member of a pair, on either chain, then on these assumptions the other member must be thymine; similarly for guanine and cytosine. The sequence of bases on a single chain does not appear to be restricted in any way. However, if only specific pairs of bases can be formed, it follows that if the sequence of bases on one chain is given, then the sequence on the other chain is automatically determined.

It has been found experimentally<sup>3,4</sup> that the ratio of the amounts of adenine to thymine, and the ratio of guanine to cytosine, are always very close to unity for deoxyribose nucleic acid.

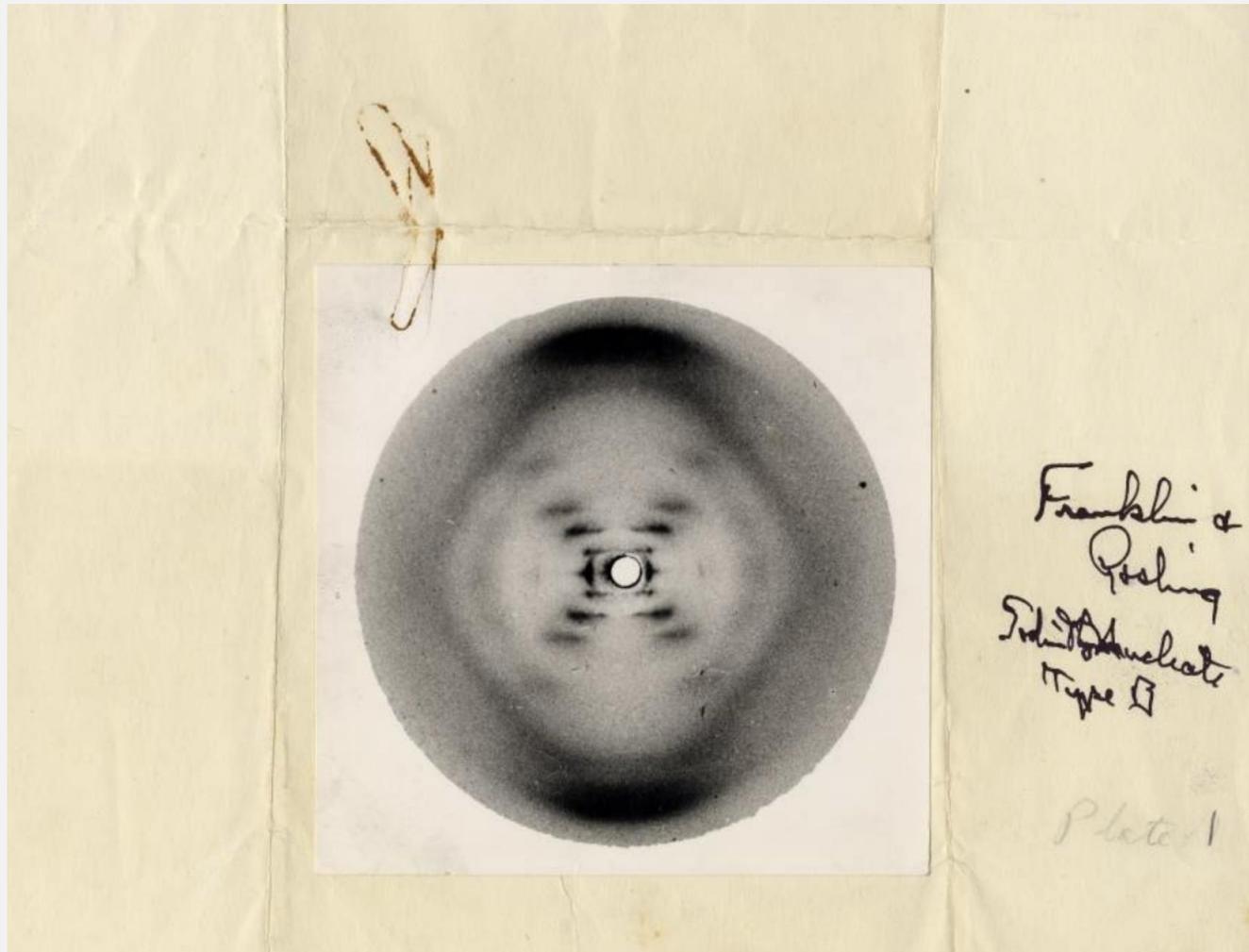
It is probably impossible to build this structure with a ribose sugar in place of the deoxyribose, as the extra oxygen atom would make too close a van der Waals contact.

The previously published X-ray data<sup>5,6</sup> on deoxyribose nucleic acid are insufficient for a rigorous test of our structure. So far as we can tell, it is roughly compatible with the experimental data, but it must be regarded as unproved until it has been checked against more exact results. Some of these are given in the following communications. We were not aware of the details of the results presented there when we devised our structure, which rests mainly though not entirely on published experimental data and stereochemical arguments.

It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material.

Full details of the structure, including the conditions assumed in building it, together with a set of co-ordinates for the atoms, will be published elsewhere.

We are much indebted to Dr. Jerry Donohue for constant advice and criticism, especially on interatomic distances. We have also been stimulated by a knowledge of the general nature of the unpublished experimental results and ideas of Dr. M. H. F. Wilkins, Dr. R. E. Franklin and their co-workers at



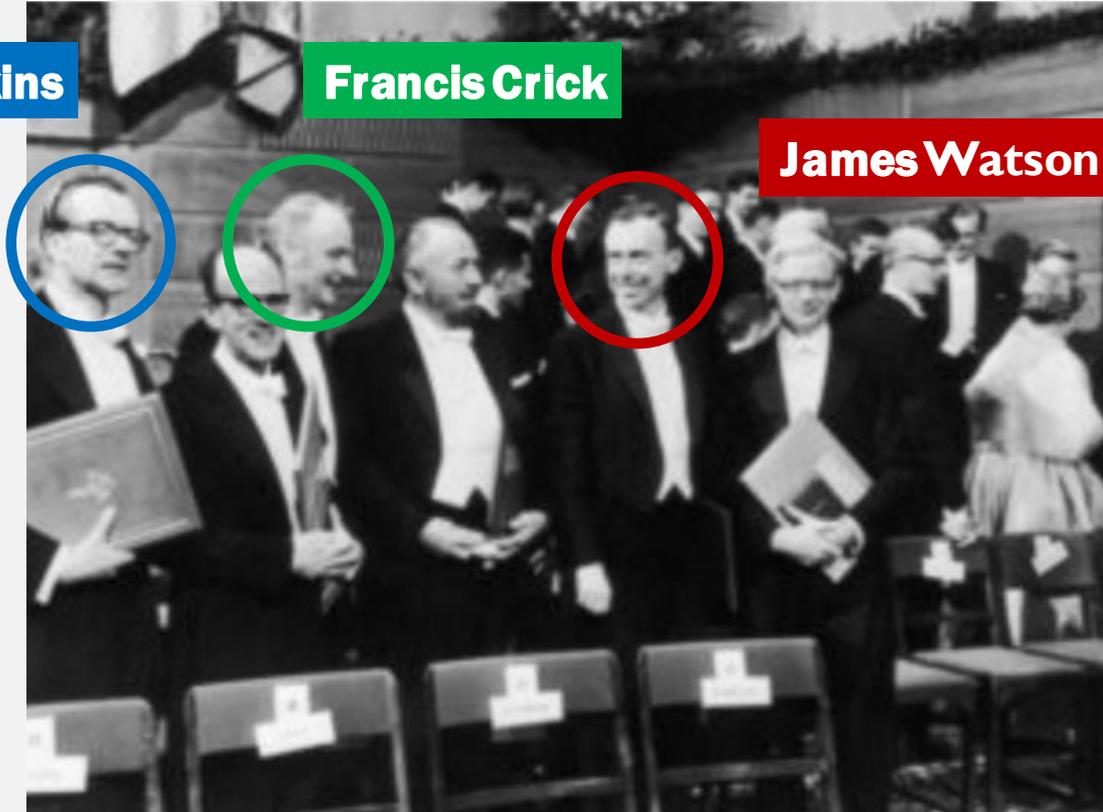
«Foto 51»

R. Franklin and R.G. Goslin, 1952

**Maurice Wilkins**

**Francis Crick**

**James Watson**



**Premio Nobel per la MEDICINA - 1962**



**Maria Clotilde Bianchi**

Le aldeidi reagiscono egualmente bene coll'etere cianacetico, anzi talora con maggiore energia, e danno i composti *ciclo-dicianglutaconici* (II).

Molti dei composti (I) forniti dai chetoni, in particolari condizioni si decompongono, come fu dimostrato con numerose esperienze dando dei carburi saturi  $C^mH^{2m+2}$  oppure  $C^mH^{2m-2}$ .

La funzione chetonica è forse la più importante funzione organica, come quella che dà luogo ad un maggior numero di condensazioni e di collegamenti molecolari e che quindi serve bene per reazioni sintetiche.

È noto che i chetoni si combinano direttamente coi bisolfiti alcalini dando dei composti  $\begin{matrix} R \\ R \end{matrix} > C \begin{matrix} < OH \\ < SO^2Me. \end{matrix}$  Non tutti i chetoni però si combinano coi bisolfiti e dalle ricerche sino ad ora note sembra che la condizione principale perchè il composto chetonico si combini coi bisolfiti sia questa: che contenga il gruppo  $-CH^2.CO.CH^3$  oppure  $-CH^2.CO.CH^2CH^3$ .

Molto generale è pure il modo di agire dell'etere cianacetico ed io anzi ho osservato che quei chetoni i quali si combinano coi bisolfiti reagiscono anche coll'etere cianacetico, e che di più, taluni di quei chetoni che non si combinano coi bisolfiti reagiscano invece coll'etere cianacetico.

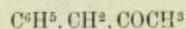
Dunque questa mia nuova reazione generale della funzione chetonica è ancor più generale di quella coi bisolfiti.

Al termine della Memoria del 1901 ho detto che io facevo delle esperienze con altri chetoni, ed invero questa reazione generale fu estesa ad altri chetoni per vedere:

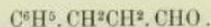
1° Quali siano i chetoni che veramente non reagiscono o reagiscono incompletamente coll'etere cianacetico e quale relazione vi sia col modo di comportarsi verso i bisolfiti.

2° Come si scompongono i nuovi composti nel senso di fornire i carburi  $C^mH^{2m+2}$  e riuscire a chiarire quel curioso, anzi straordinario, modo di decomporsi.

Questa reazione coll'etere cianacetico può servire a distinguere se un dato composto sia piuttosto un chetone od un'aldeide, quale è il caso di:



e l'isomero:



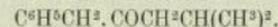
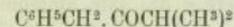
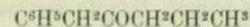
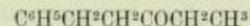
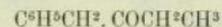
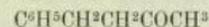
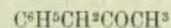
Alla fine di questo lungo lavoro sull'etere cianacetico che ho in gran parte pubblicato, dal 1892 al 1905, dimostrerò la grande importanza dell'etere cianacetico nella sintesi di composti organici e nel dar origine a composti con gruppi atomici più o meno mobili.

Nel lavoro pubblicato nel 1901 ho sperimentato con i chetoni seguenti: acetone, metiletilchetone, metilpropile e metilisopropilchetone, metilbutil e metilisobutilchetone, metiltrimetiletilchetone o pinacolina, metilessilchetone n. e metilisoessilchetone, metileptenone, metilnonilchetone, dietilchetone, etilpropilchetone, dipropilchetone e propilisossilchetone, metilfenilchetone, metilfenetilchetone, ed ho fatto un breve cenno sul benzilidenacetone e sul dibenzilchetone, intorno ai quali dovevo occuparmi in seguito.

#### PARTE I.

#### Chetoni $C^mH^{2m-7}.(CH^2)^n.CO.(CH^2)^mCH^3$ .

In questa comunicazione dirò dei risultati ottenuti con i chetoni che hanno per tipo il metilbenzilchetone  $C^6H^5CH^2COCH^3$  e suoi omologhi e che si possono rappresentare con  $C^mH^{2m-7}.(CH^2)^n.CO.(CH^2)^mCH^3$ . Ne ho studiati sette:



Queste ricerche risalgono al 1907-1908 e furono in parte fatte o rifatte nel 1913. Fui coadiuvato in queste ultime ricerche dal mio assistente d'allora signorina dott.<sup>a</sup> [Maria Clotilde Bianchi](#), che volentieri ringrazio.

Magnifico Rettore  
della R. Università di Torino

La sottoscritta, aiuto all'Istituto di Chimica farmaceutica e Tossicologica, presso il Professore Luaretti, chiamata in servizio come ufficiale-farmacista agli Ospedali territoriali della Croce Rossa, rassegna le proprie dimissioni dalla carica suddetta.

Con ossequio

Dr. lei ser<sup>na</sup>

Dr. Maria Clotilde Bianchi

Torino 23 Settembre 1915.

La signora G. M. Cl.  
Bianchi, cotta di <sup>la</sup> ~~la~~  
fido di aiuto nella  
il labor. di chim. farm.

all'Univ. di Torino  
della R. Università  
di Torino

Torino 23 Sett. 1915

All'Univ. di Torino,

La signora G. M. Cl.  
Clotilde Bianchi, aiuto in  
questo Laboratorio è ora  
tenente farmacista nell'osp.  
pedale della Croce Rossa  
in Piazza Venezia e mi dice  
di un professore venuto in  
laboratorio nessuno per  
meglio ora al giorno; come  
infatti dalla fine di mag-  
gio di ora un bi è mai  
vita. In tale stato di cose  
la signora Bianchi, coniglio,  
ha da me, dà le sue dimis-  
sioni e lascia vacante il  
posto di aiuto al quale pro-  
vederò fra poco.

Con ossequio  
G. Luaretti



ELISA  
CORINO

=  
**DONNE DI**  
**CO-**  
**SCIENZA**

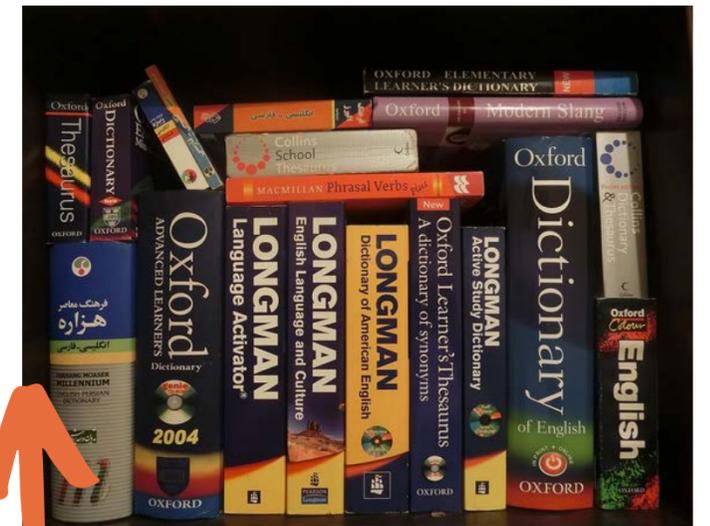
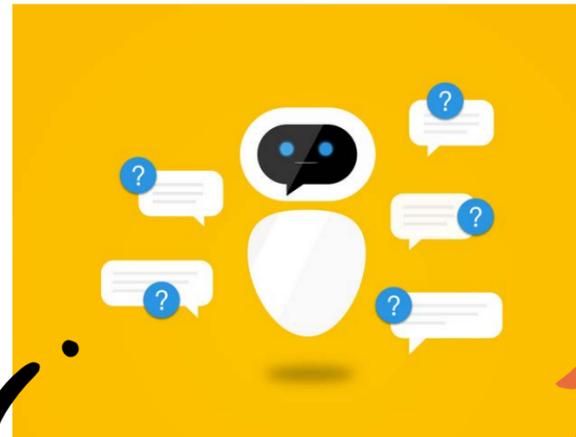
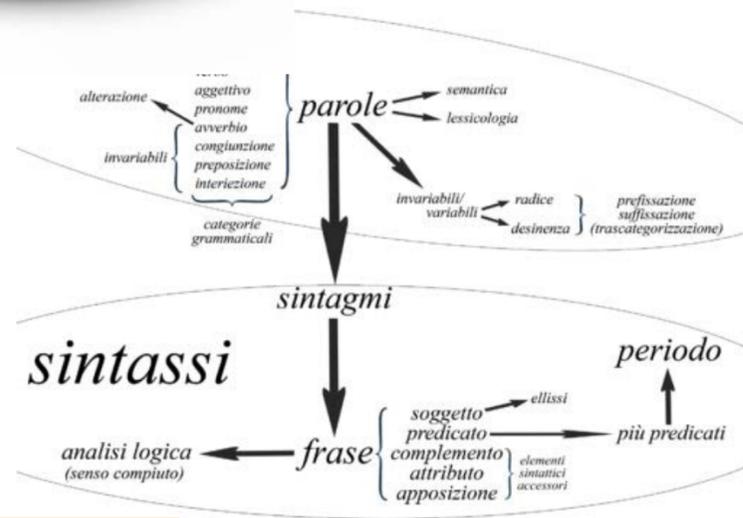
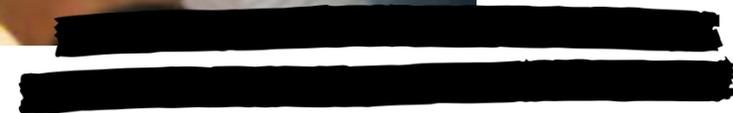
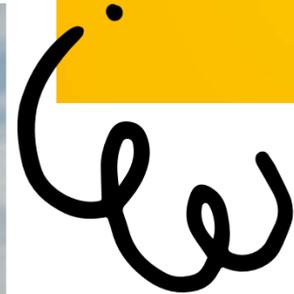
**MARY  
HAAS**



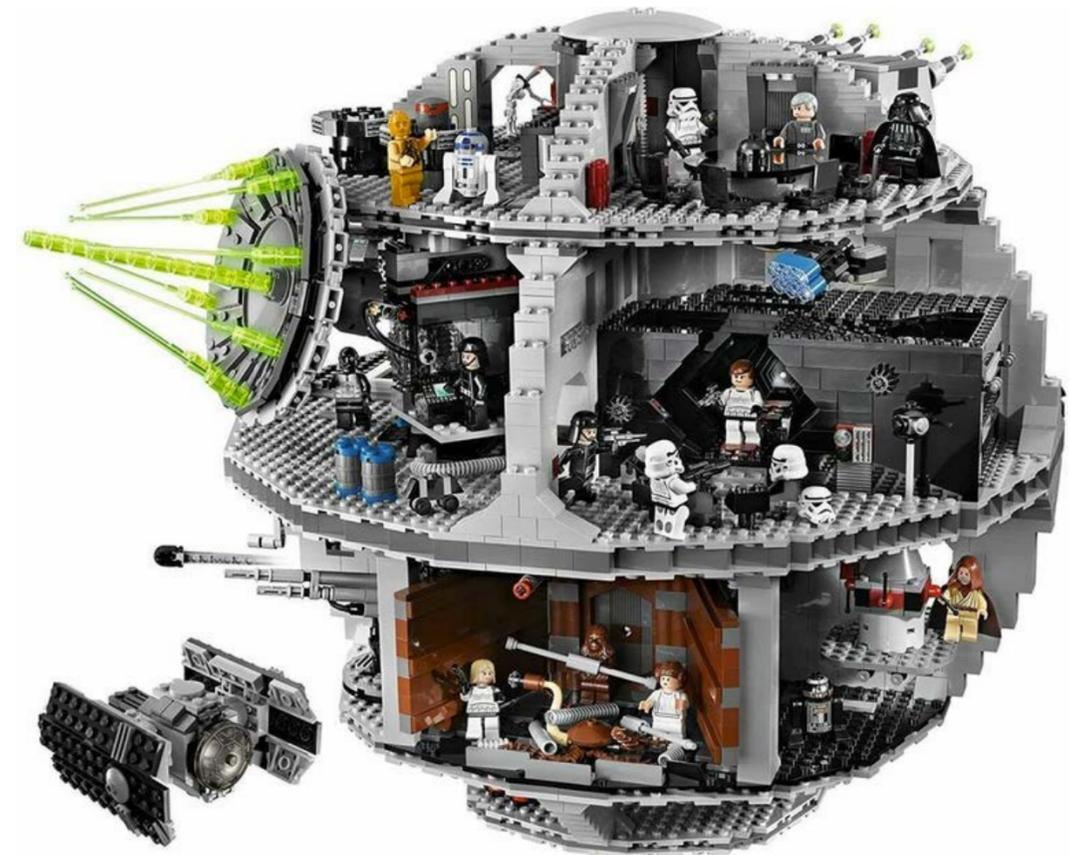
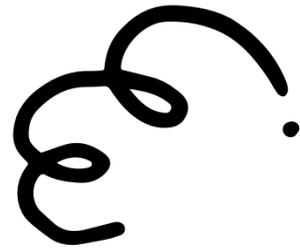
MA PRIMA...



COSA FA UN LINGUISTA?



# COME?



# COME?



POLTRONA  
VS  
CAMPO

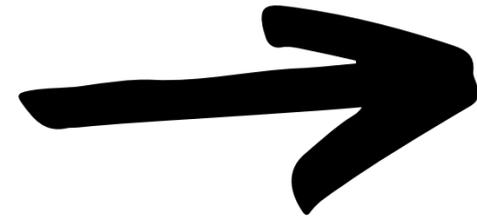


# MARY HAAS CHI ERA?

- Richmond, Indiana  
23 gennaio 1910 – 17 maggio 1996
  - Studi a Yale
  - Insegnamento a Berkley
- 
- 



MARY HAAS

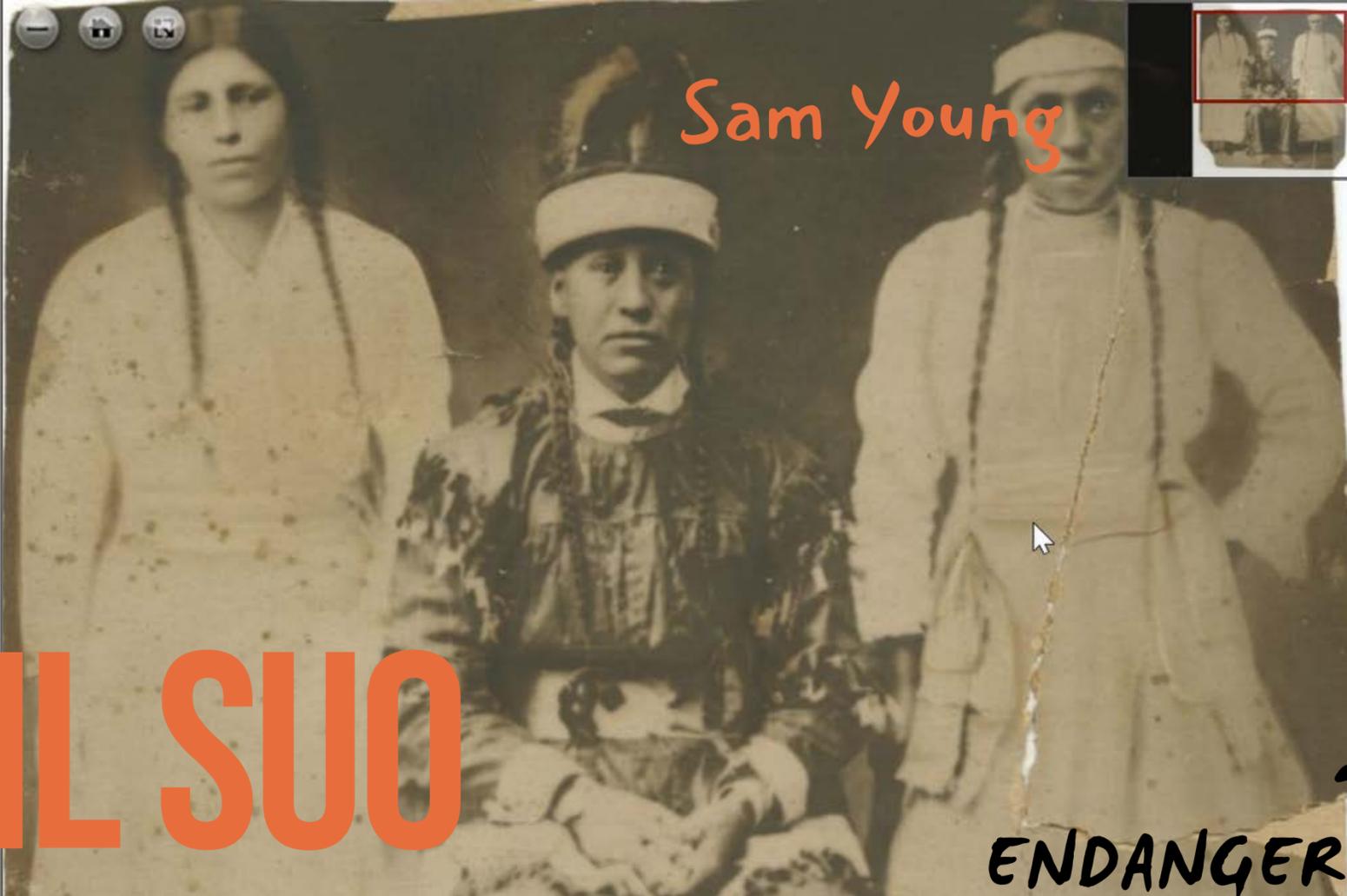


LINGUISTA DA  
CAMPO

REGISTRAZIONE  
E DESCRIZIONE



Mary Haas was a Renaissance model of a scholar. A great field phonetician, she combined a stunningly sharp ear with an acute sense of pattern and system, and a gift for accurate production herself. She was also a great grammarian who wrote two superb grammars of radically different languages: Tunica (Haas 1941f), a language of southeastern North America with a single speaker when she recorded it, and Thai (Haas and Subhanka 1945, 1948), a language spoken by tens of millions. One is a reference grammar, the other a teaching grammar,



Sam Young

# IL SUO CONTRIBUTO

ENDANGERED  
LANGUAGES



Jun. Caus. Verba.

- y'cha, y'cha...c. to spread out the tail
- y'ana + lepi...c. to speak, talk
- y'alu...c. m. persnif. to hail
- w'ira...c. intr. to count
- w'ira...c. a count, unit, a minute
- w'ira...c. intr. to. to make a question, inquire
- w'ihka, w'ihka...c. to scratch the skin so as to let blood
- w'ira...c. intr. to hunt
- w'aka...c. to split, for, when incision is ...
- w'ra...c. to pull up ...
- pahta...c. to. to get... intricatid
- pahti...c. to. to fill ...
- pa'ka...c. intr. to answer, reply
- pa'ga...c. to shake ...
- pa'ka...c. to swell, inflate
- pa'hti...c. to beat on (pounder), apply dent
- ma'ra...c. m. persnif. to lighten // ma'ra to light-up (the wood)
- m'ika, m'ika...c. to allow ...
- m'aki...c. to flow ...
- m'ia...c. m. persnif. to drizzle
- m'hti, m'hti...c. m. persnif. to snow
- m'hta, m'hta...c. to sweep
- m'kki, m'kki...c. intr. to bend, lean over, bow
- m'kki, m'kki...c. intr. to smoke, steam
- ta'ka...c. to give name to ..., to name ...
- ta'hi...c. to circle around

Inanimate Nouns  
All Body-part terms

y'i', y'i'te, y'i'te w'ista m  
(h. km)

y'i'mohku f. herb, weed f  
y'i'mohku na'mit'e stinkweed

ya'n'ra f. sea, ocean

ya'lukki f. fungus

ya'rukki "ax" m.

ya'hki joint, needle m.

ya'hkit'eawl m.

wi'si water f

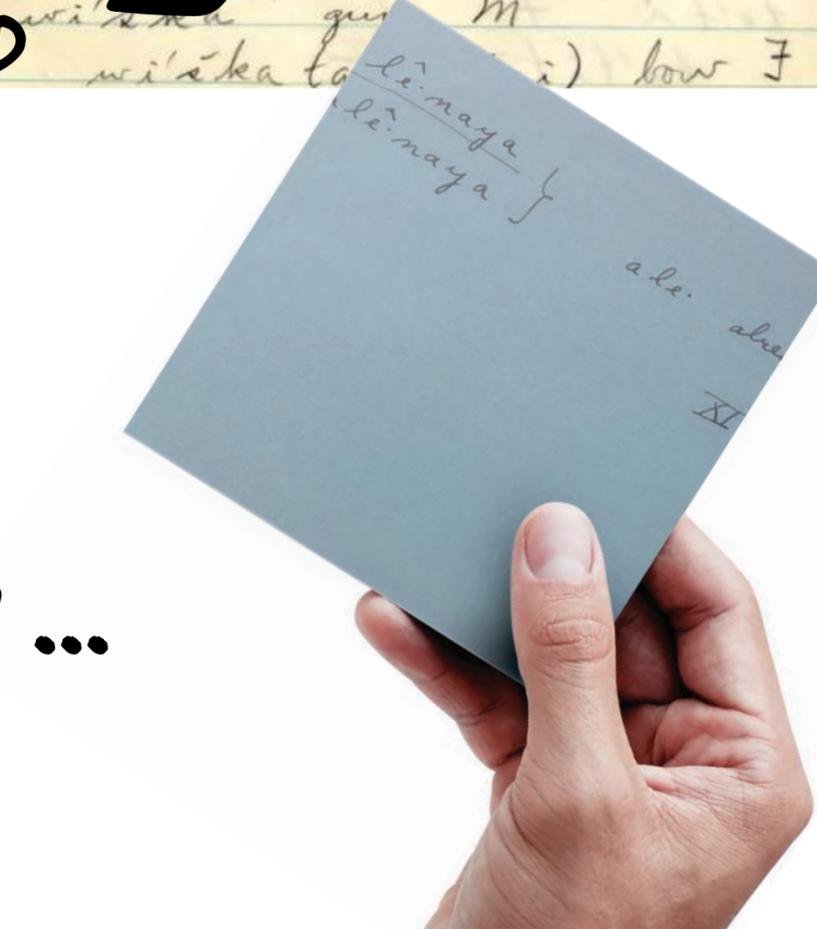
wi's'pelta pond f (now m)

wi's'a'eri water-jug m

wi's'ka ta (i) bow f



TUNICA NATCHES CREEK KOSATI ...



**ENDANGERED  
LANGUAGES !!**

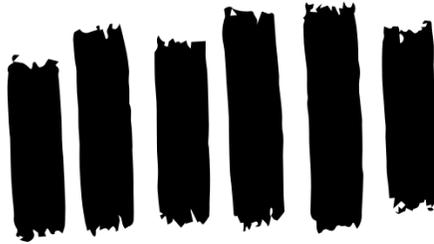
# TUNICA

  
**UN ESEMPIO** 

**HÁYIŠÍKU,**

**TÓNÍKU,?**

**UHKÁ'LIN?UHKÉNI**

 **THE ONE ABOVE**

**MAN**

**CREATED IT IS SAID.**

**INDEP. SUBJ.**

**INDEP. OBJ. PREDICATE WORD**

<http://www.endangeredlanguages.com/#/3/32.314/-35.859/0/100000/0/low/mid/high/dormant/awakening/unknown>

Create your account · Sign in · Change Language:EN ·

Search



DONATE



Supporting and celebrating global linguistic diversity

Map

Languages

Resources

Submit

Blog

Download

About

Simple

Detailed

AT RISK

ENDANGERED

SEVERELY ENDANGERED

DORMANT

AWAKENING

VITALITY UNKNOWN

## Koasati

Vitality: Severely Endangered

200 speakers

4 documents and resources

3 videos

Back to home page

Some languages lack geographic data and do not appear on this map.

**MARY**



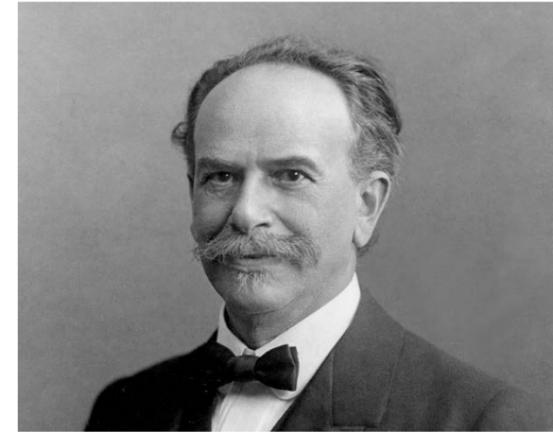
**HAAS E**

**"GLI**

**ALTRI"**



**FRANZ BOAS**



**EDWARD SAPIR**



**BENJAMIN LEE  
WHORF**



# PER APPROFONDIRE

siti e  
→ riferimenti utili

## ① **MATERIALI E STUDI DI MARY HAAS**

<https://search.amphilsoc.org/collections/view?docId=ead/Mss.Ms.Coll.94-ead.xml>

## ② **ENDANGERED LANGUAGES**

<http://www.endangeredlanguages.com/>

---