BUSH MEDICINE & DIABETES: CAUSE OR CURE ?

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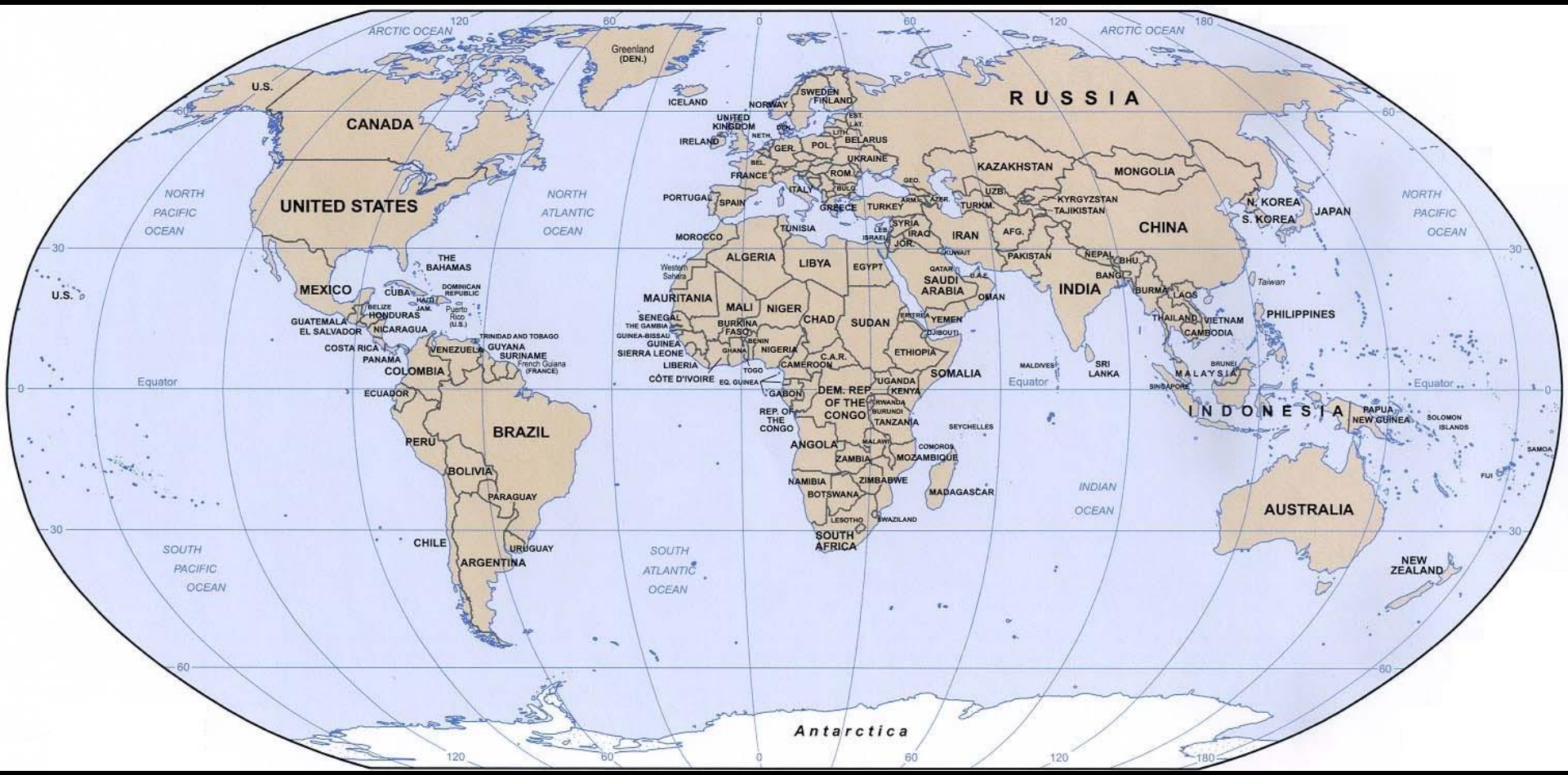
THE WORLD


ARCTIC OCEAN
Greenland (DEN.)
U.S.
CANADA
UNITED STATES
MEXICO
CUBA
THE BAHAMAS
DOMINICAN REPUBLIC
HAITI
JAM.
Puerto Rico (U.S.)
BELIZE
HONDURAS
GUATEMALA
EL SALVADOR
NICARAGUA
COSTA RICA
PANAMA
TRINIDAD AND TOBAGO
VENEZUELA
GUYANA
SURINAME
French Guiana (FRANCE)
COLOMBIA
ECUADOR
PERU
BRAZIL
BOLIVIA
PARAGUAY
CHILE
URUGUAY
ARGENTINA
NORTH PACIFIC OCEAN
NORTH ATLANTIC OCEAN
SOUTH PACIFIC OCEAN
SOUTH ATLANTIC OCEAN
INDIAN OCEAN
Equator
ICELAND
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SAUDI ARABIA
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YEMEN
DJIBOUTI
ERITREA
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SENEGAL
THE GAMBIA
GUINEA-BISSAU
GUINEA
SIERRA LEONE
LIBERIA
CÔTE D'IVOIRE
MALI
NIGER
CHAD
SUDAN
BURKINA FASO
BENIN
TOGO
GHANA
NIGERIA
CAMEROON
C.A.R.
EQ. GUINEA
GABON
REP. OF THE CONGO
DEM. REP. OF THE CONGO
UGANDA
KENYA
RWANDA
BURUNDI
TANZANIA
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SOMALIA
SEYCHELLES
COMOROS
ANGOLA
ZAMBIA
MALAWI
MOZAMBIQUE
NAMIBIA
BOTSWANA
ZIMBABWE
MADAGASCAR
LESOTHO
SWAZILAND
SOUTH AFRICA
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N. KOREA
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INDIA
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LAOS
THAILAND
VIETNAM
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SRI LANKA
BRUNEI
MALAYSIA
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INDONESIA
PAPUA NEW GUINEA
SOLOMON ISLANDS
SAMOA
FIJI
AUSTRALIA
NEW ZEALAND
Antarctica

THE CARIBBEAN AND CENTRAL AMERICA

Hugh Jones 1955

Zuidema 1956

Morrison 1981

Atypical Diabetes:

Undernutrition

Bush teas (CAM)

Staple root crops

(JCEM 1995, 80, 1996-2001)

A HYPOTHESIS FOR THE AETIOLOGY OF DIABETES MELLITUS

FOOD “TOXINS”, UNDERNUTRITION

FREE RADICALS

A HYPOTHESIS FOR THE AETIOLOGY OF DIABETES MELLITUS (CONTD.)

Level 1.....

FR

↓

DAMAGE TO CELL MEMBRANE

A HYPOTHESIS FOR THE AETIOLOGY OF DIABETES MELLITUS (CONTD.)

DAMAGE TO CELL MEMBRANE

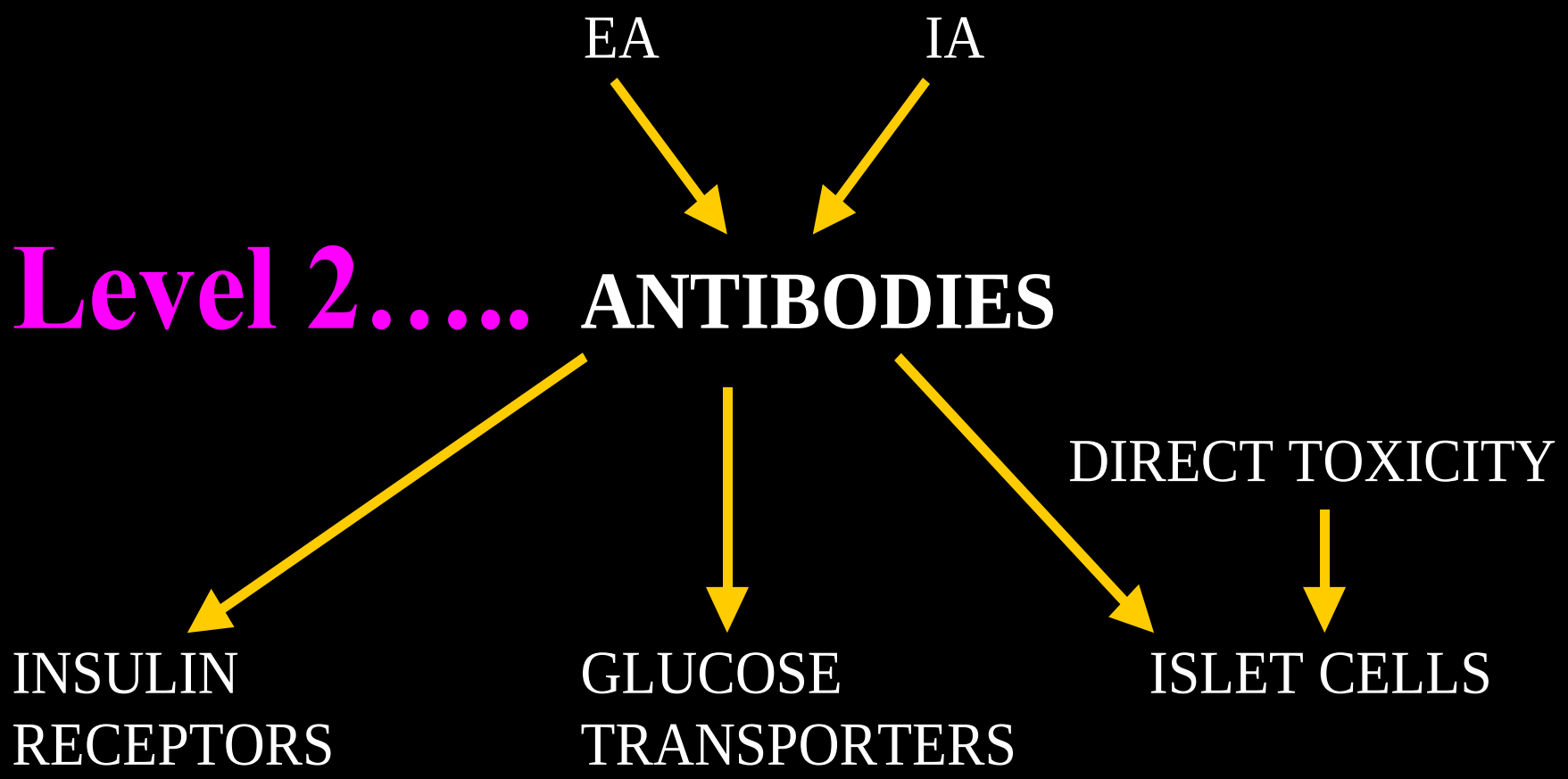
VIRAL INFECTIONS

EXPOSED ANTIGENS

INDUCED ANTIGENS

A HYPOTHESIS FOR THE AETIOLOGY OF DIABETES MELLITUS (CONTD.)

Level 2…..

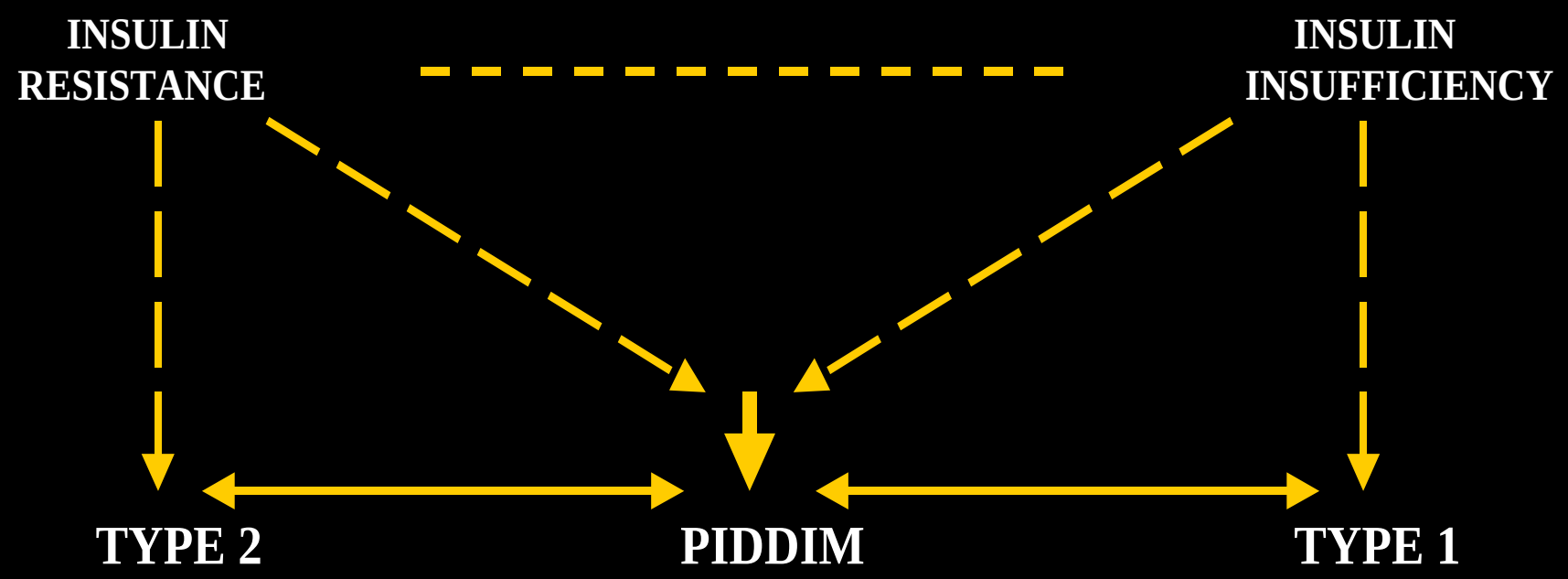


A HYPOTHESIS FOR THE AETIOLOGY OF DIABETES MELLITUS (CONTD.)

OBESITY IR GT IC

Level 3… INSULIN RESISTANCE - - - - - - - INSULIN INSUFFICIENCY

The clinical syndromes



The central dogma

Level 1: Membrane damage

Level 2: Antibody production

Level 3: Insulin resistance & insufficiency

ROOT CROPS…

…a case study.

CASSAVA (MANIHOT ESCULENTA)

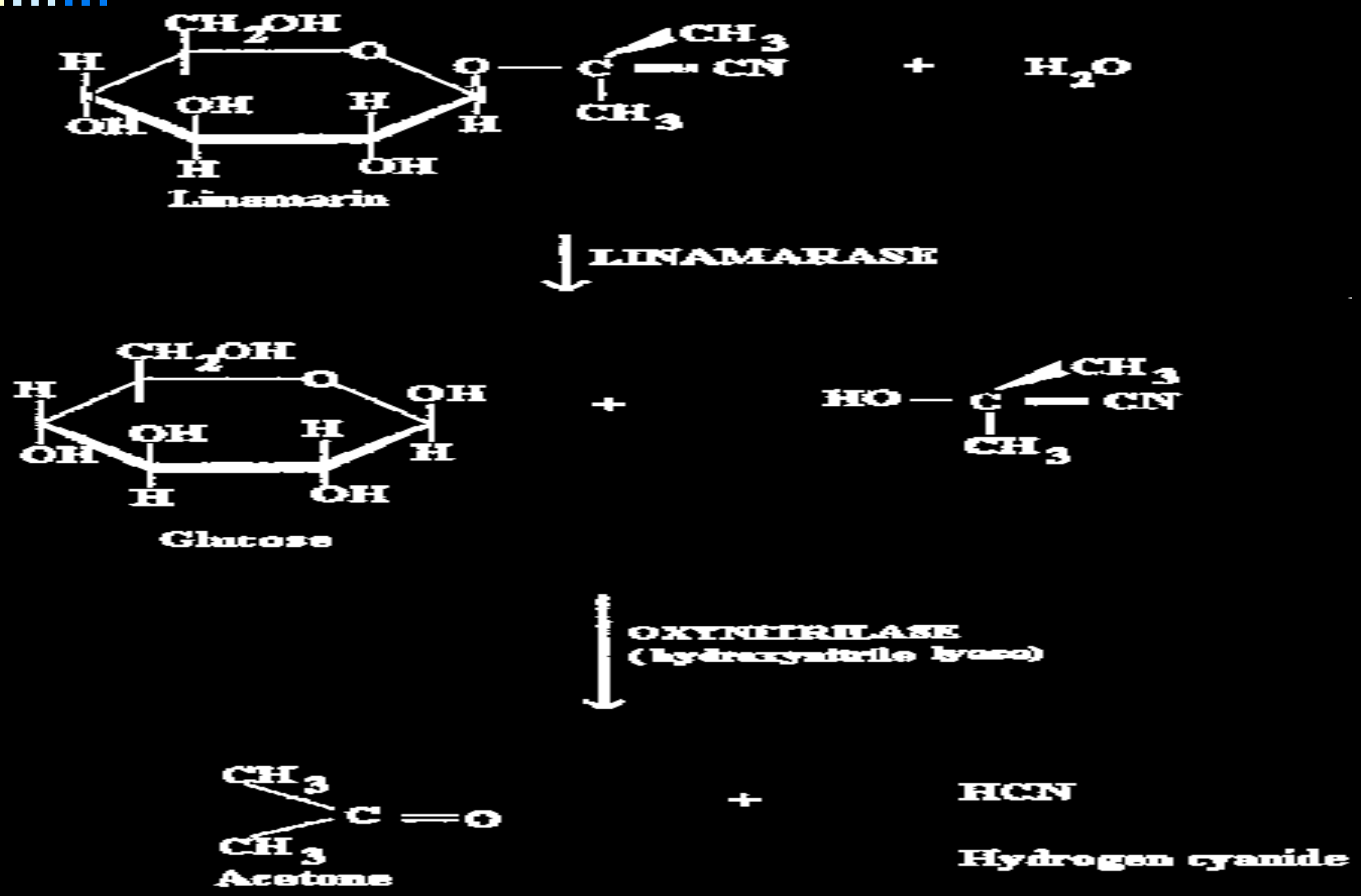
Seed yam tubers derived from Tissue culture

CYANOGLUCOSIDES

Eg: Linamarin, lotaustralin (toxic cyanide radical)

Found in root crops:

- Cassava, yucca *(Manihot esculenta),*
- Yams (*Dioscorides* group)



ENZYMATIC DEGRADATION OF LINAMARIN

TRANSAMINATION

L-CYSTEINE → 3 **MERCAPTOPYRUVATE**

[$SHCH_2CH(NH_2)COOH$] [$HSCH_2COCOOH$]

↓ CN - SULPHUR TRANSFERASE

SCN + PYRUVATE

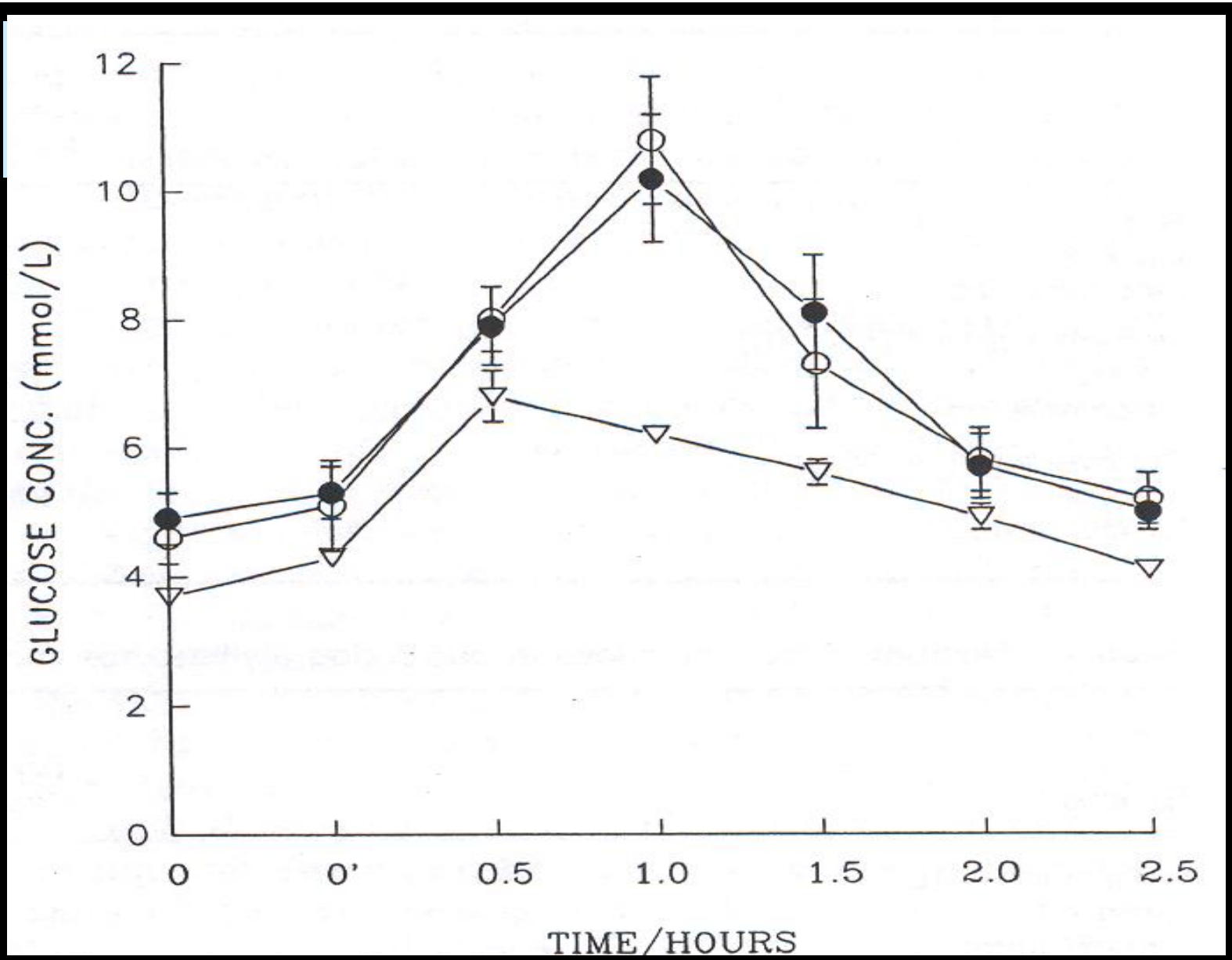
METABOLIC PATHWAY OF CYANIDE WITH 3 - MERCAPTOPYRUVATE

TESTING THE HYPOTHESIS

DOG POPULATION	T_0	T_1
(Linamarin feeding)	FPG mmol/l	
NORMAL (n=15)	4.3	4.5
UNDER-NOURISHED (n=10)	4.0	5.8*
RECOVERED (n=10)	5.1	5.3

*$P < 0.01$**

J Nutr Biochem 1993,4, 625-9


GLUCOSE CONC. (mmol/L)
12
10
8
6
4
2
0
0
0'
0.5
1.0
1.5
2.0
2.5
TIME/HOURS

TESTING THE HYPOTHESIS

DOG POPULATION	T_0	T_1
	FPI uIU/ml	
NORMAL (n=15)	42.5	33.7
UNDER-NOURISHED (n=10)	35.6	20.8*
RECOVERED (n=10)	33.9	26.3

*$P < 0.01$**

J Nutr Biochem 1993,4, 625-9

BUSH TEAS…

…a case study.

ANNATTO *(Bixa orellana)*

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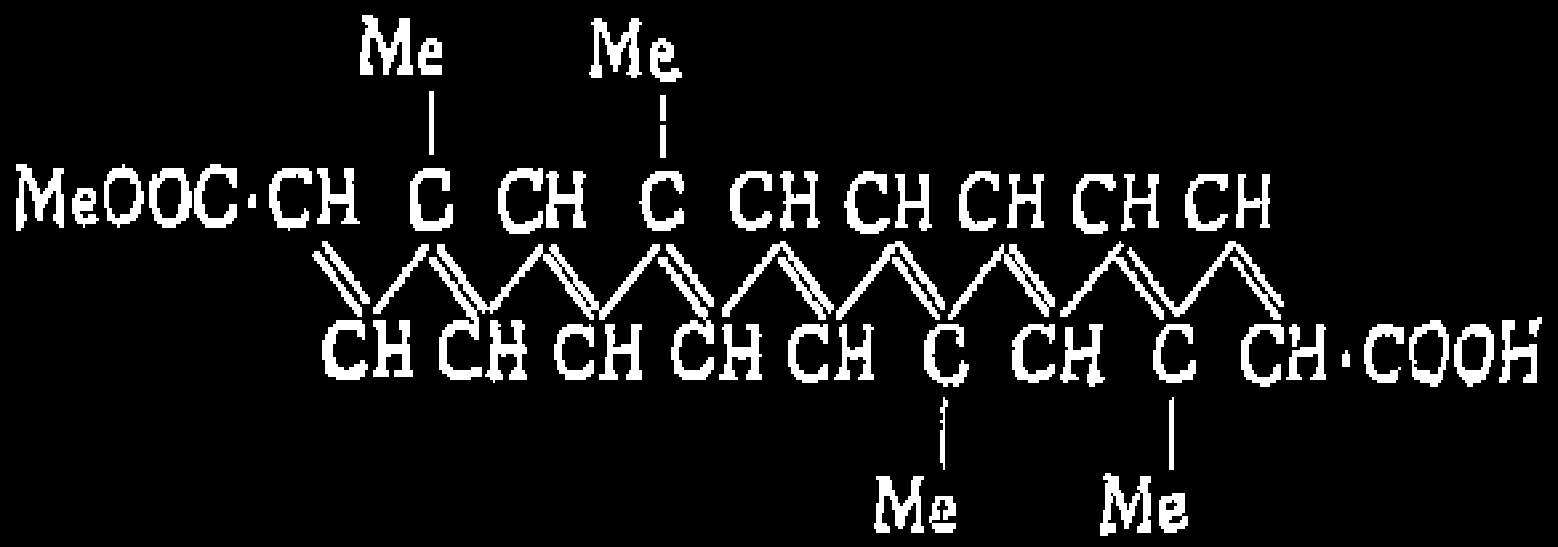
ANNATTO *(Bixa orellana)*

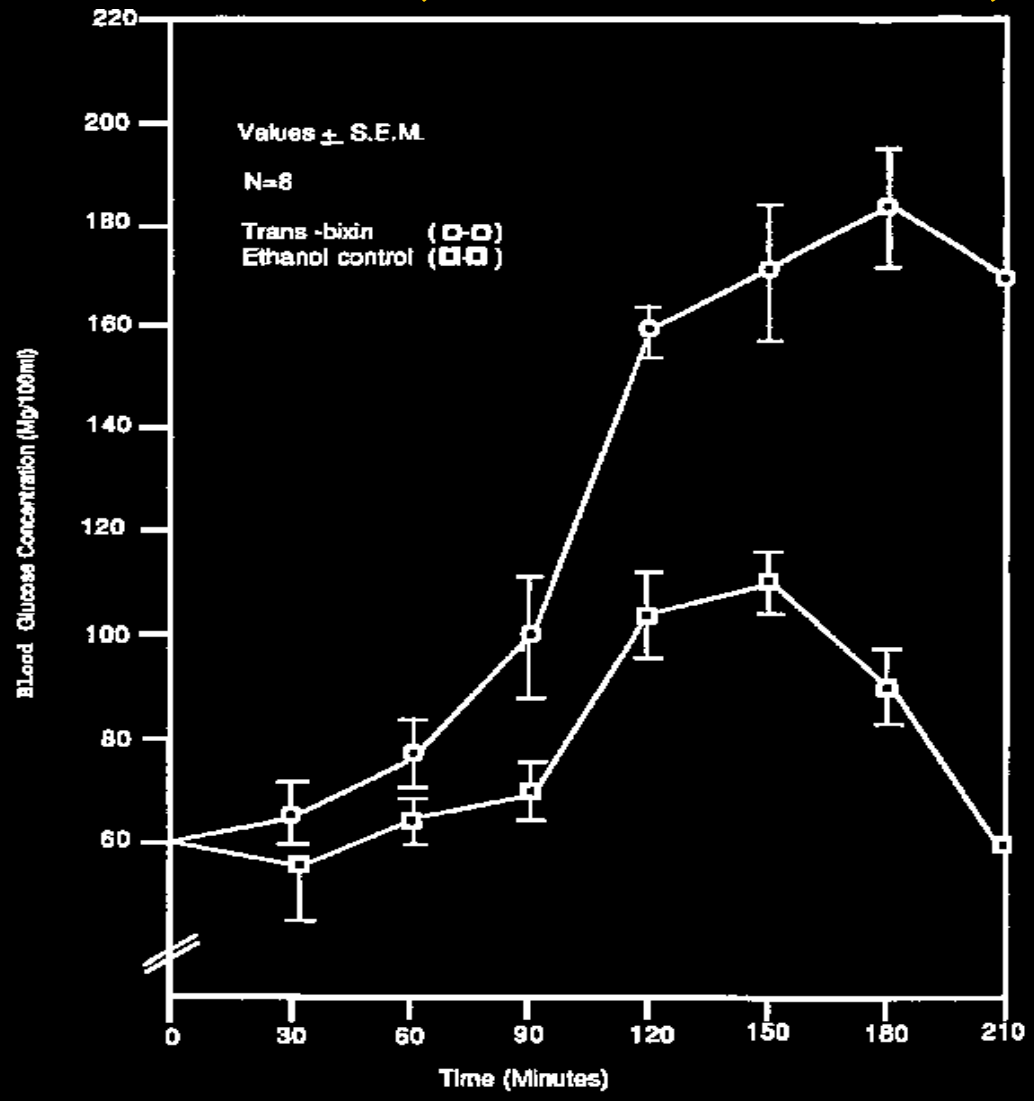


TRANS-BIXIN (PANCREATOTOXIN)

$C_{25}H_{30}O_4$

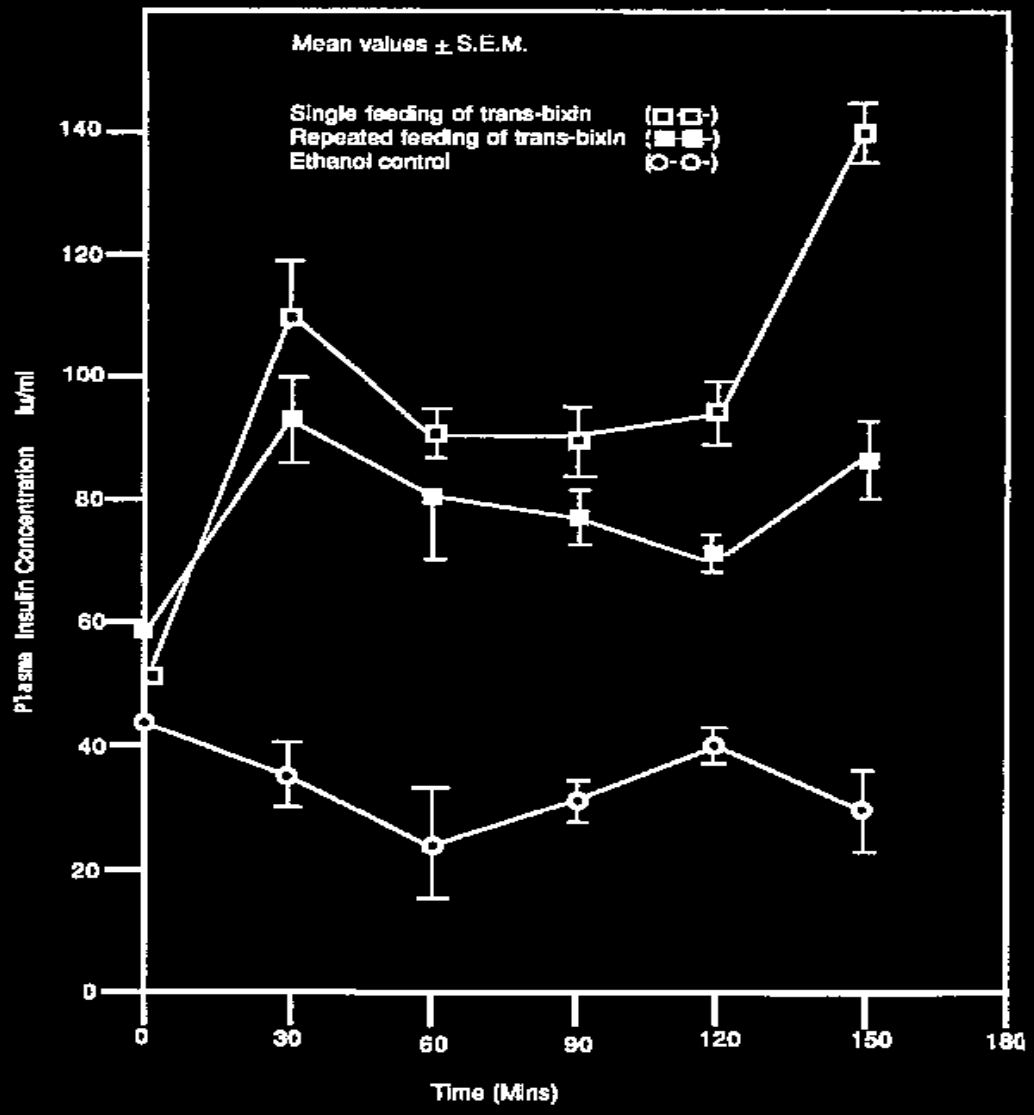
(TROP. GEOG. MED, 1991, 43, 184-8)

ANNATTO (*Bixa orellana*)



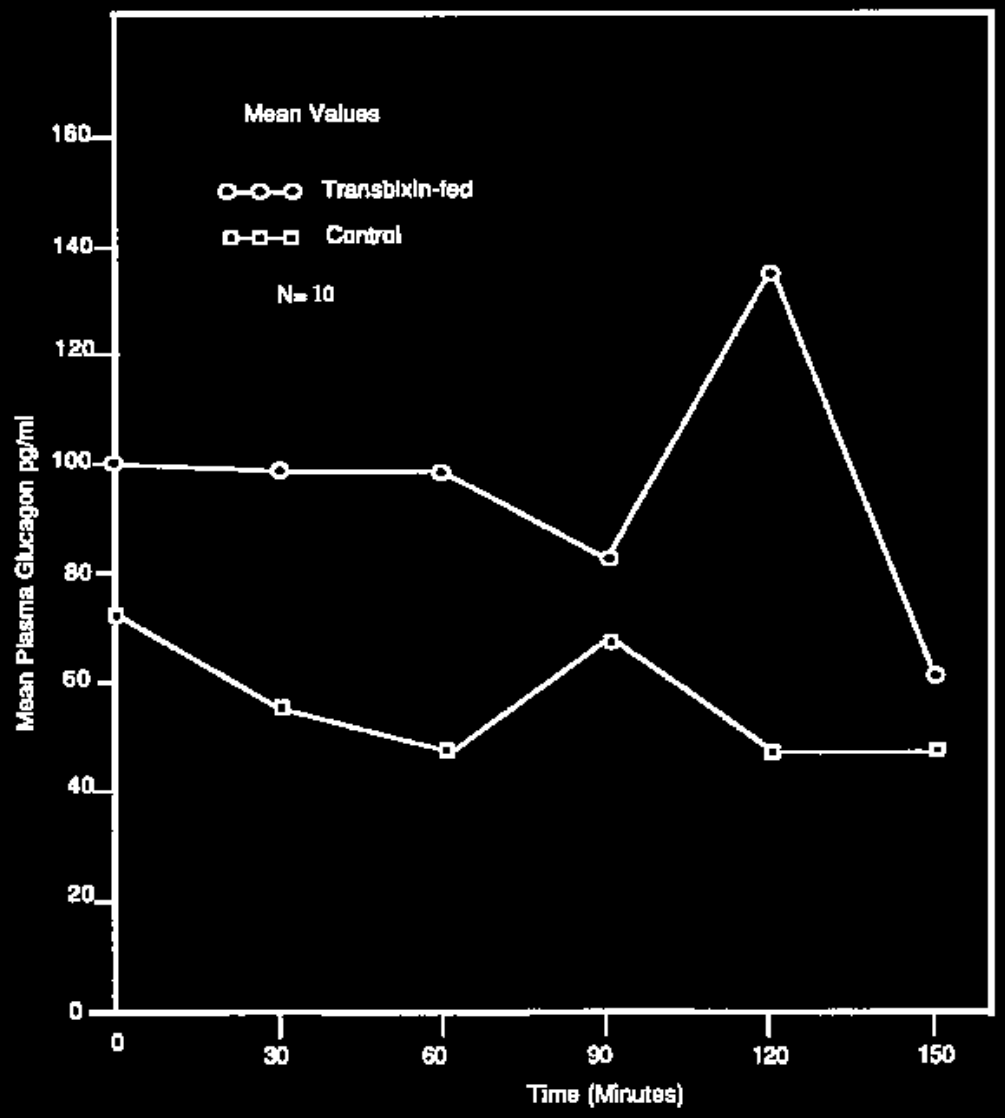
GTT of Dogs maintained on trans-bixin for six months

ANNATTO (BIXA ORELLANA)



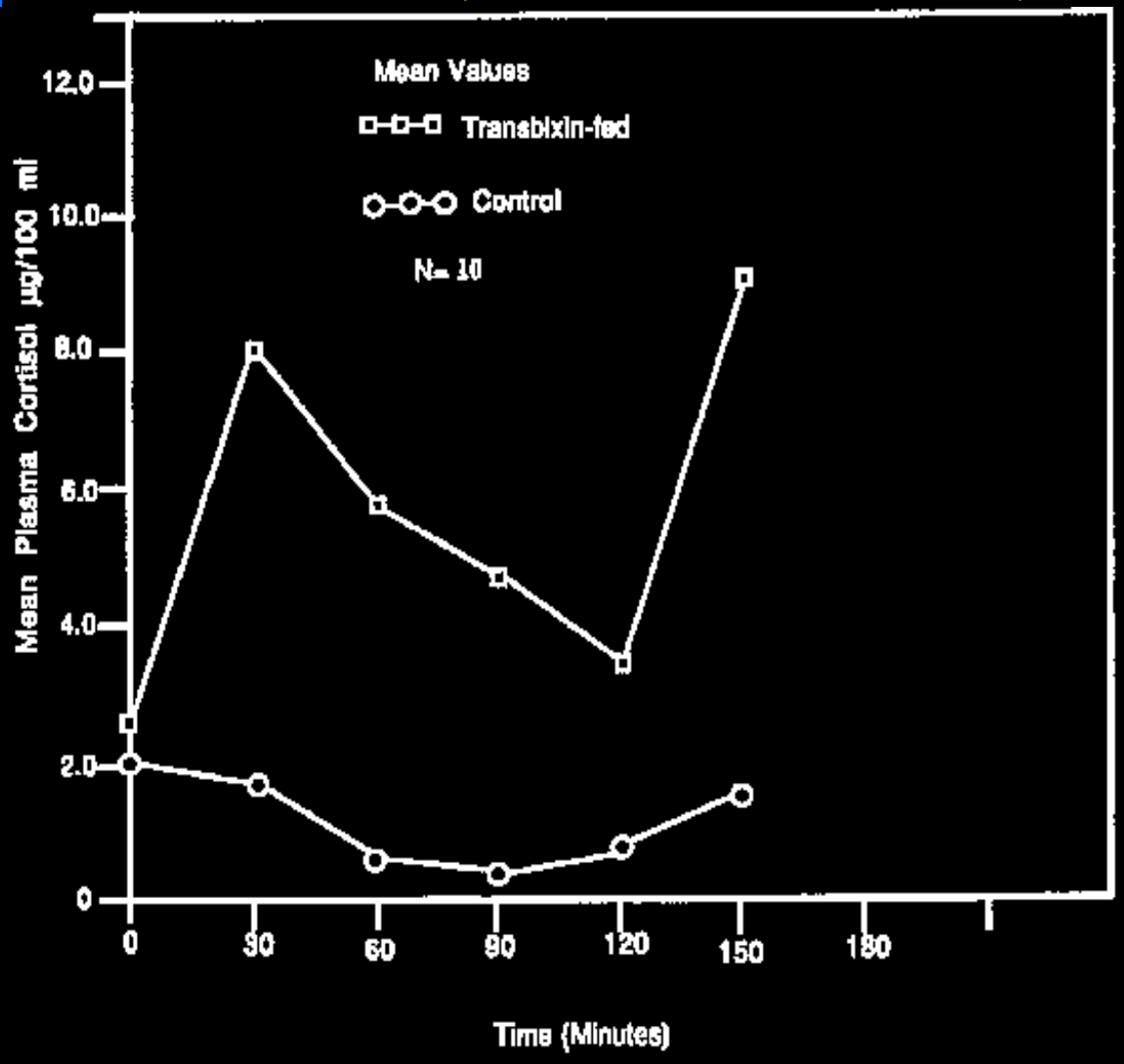
Effects of trans-bixin on plasma insulin levels

ANNATTO (*Bixa orellana*)



Effects of trans-bixin on plasma glucagon levels

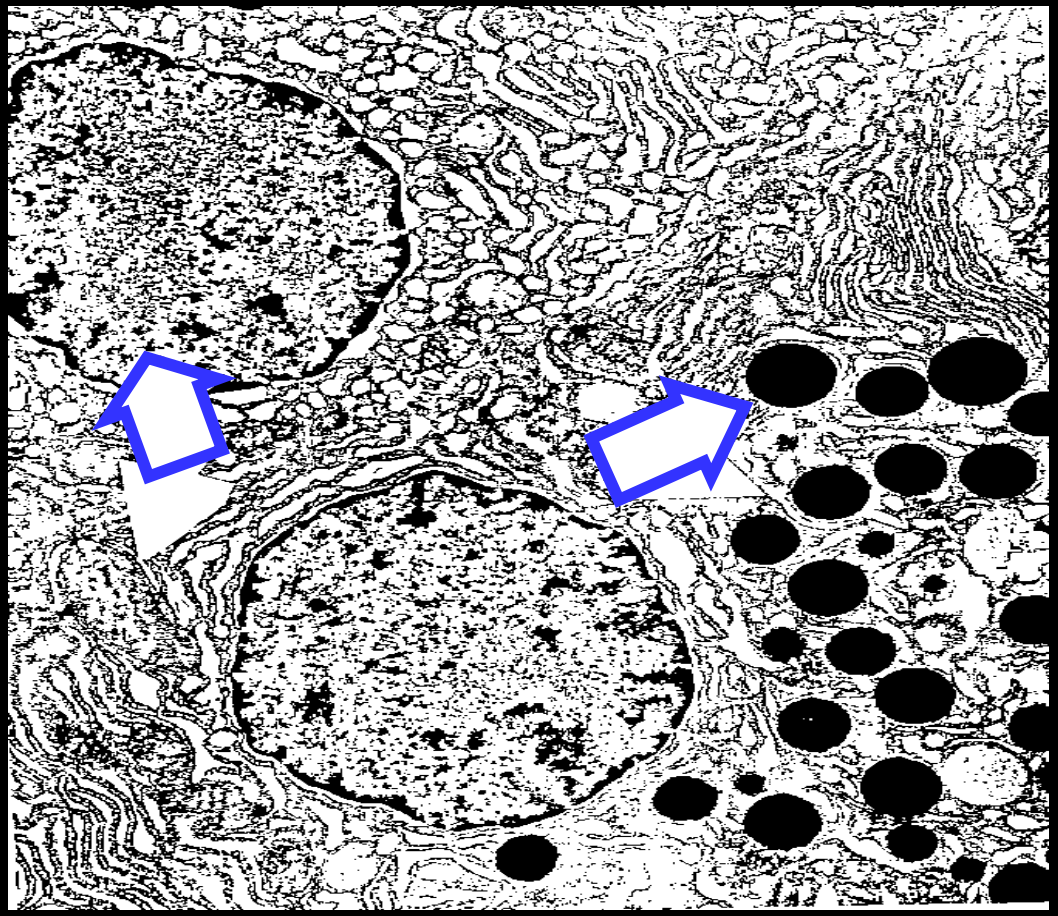
ANNATTO (*Bixa orellana*)



Effects of trans-bixin on plasma cortisol levels

ANNATTO (*Bixa orellana*)

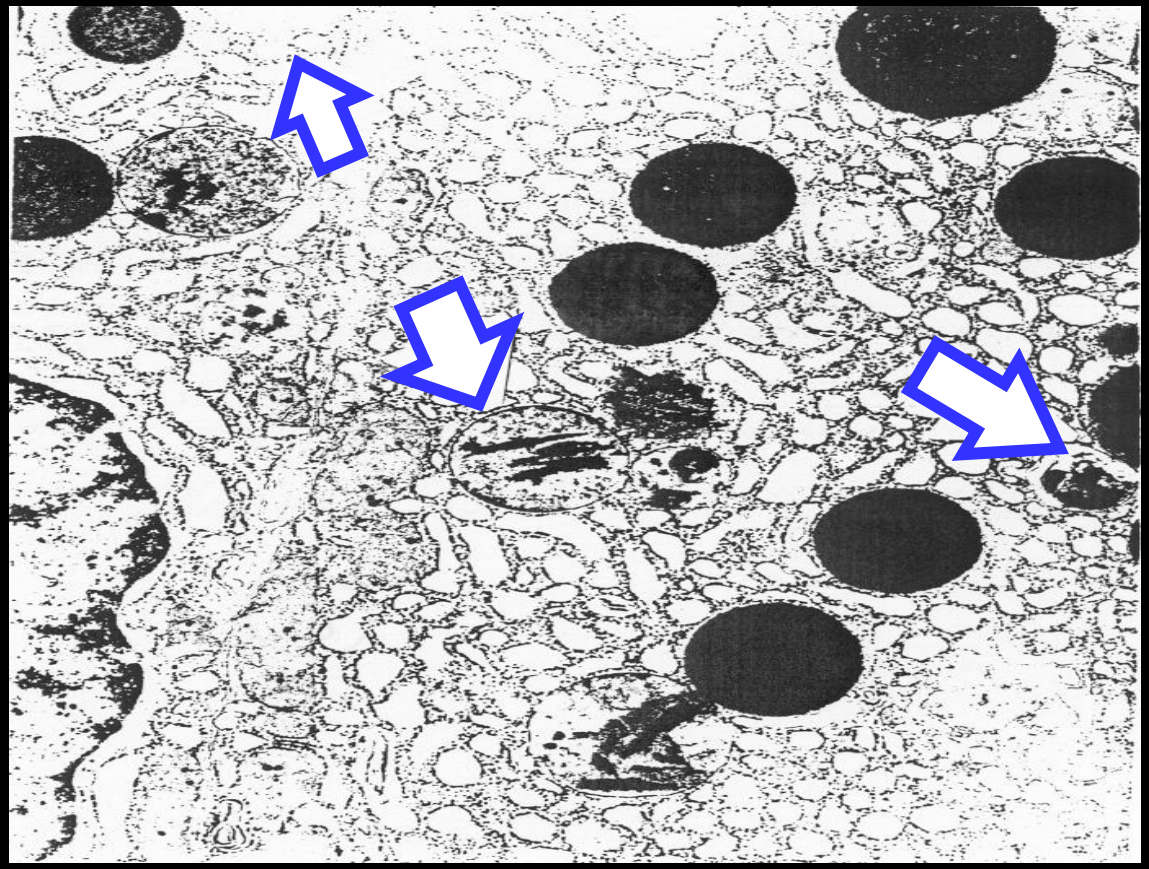
Trans-bixin Feeding (T_0)



Arrows point to intact mitochondria and zymogen granules

ANNATTO (*Bixa orellana*)

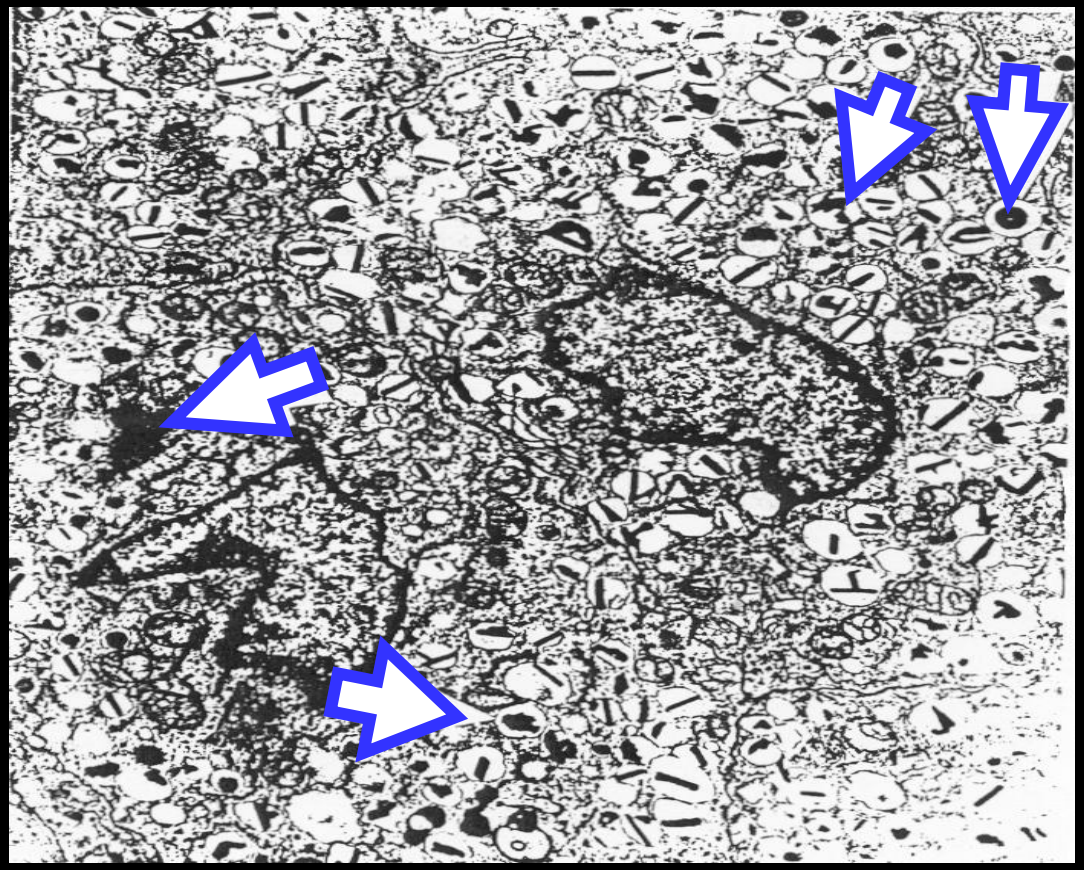
One month after Trans-bixin



Arrows show stacking of mitochondria cristae and zymogen destruction

ANNATTO (*Bixa orellana*)

Twenty four months on Trans-bixin

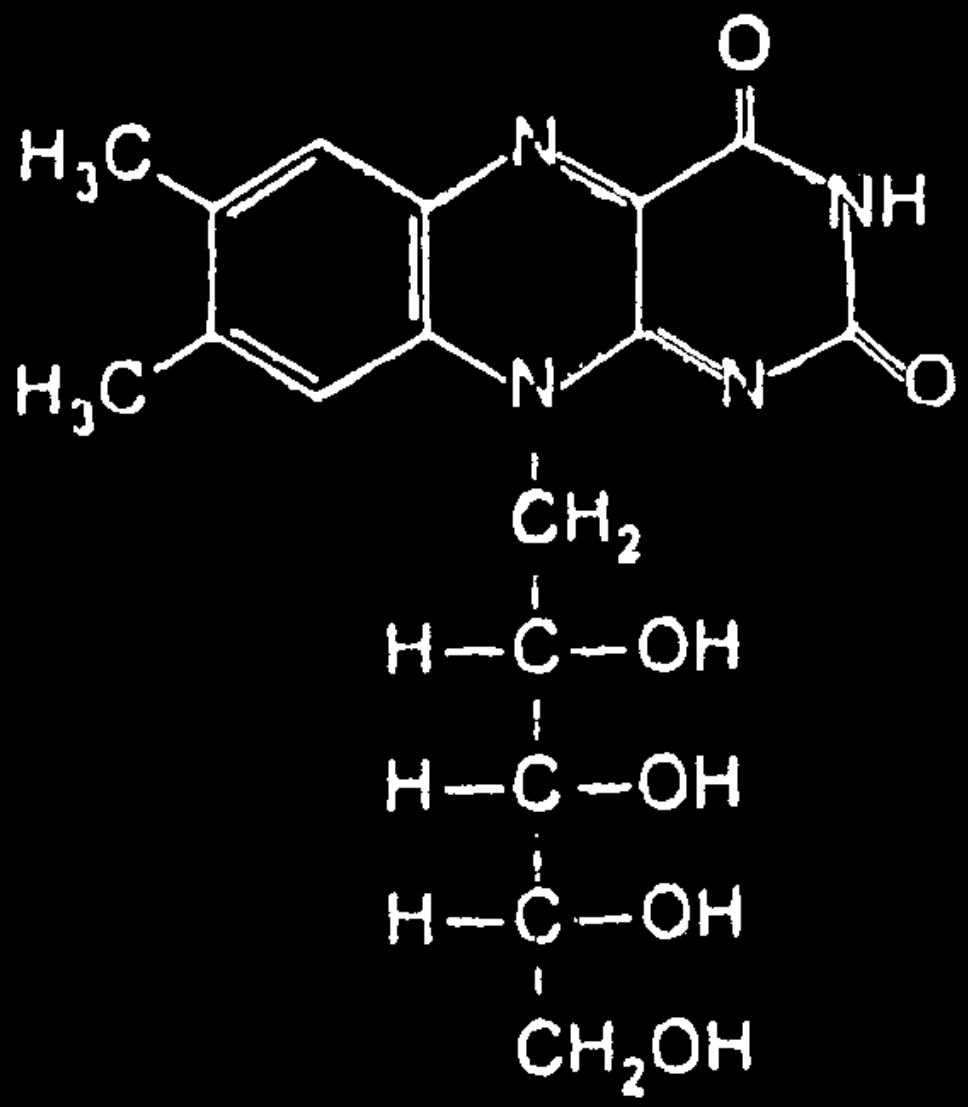


GENERALISED ISLET CELL DAMAGE

UNDERNUTRITION PREDISPOSES TO.... Accumulated free radicals and reactive oxygen species…..

TOXIC DAMAGE

PROTECTIVE!



FORMULA OF RIBOFLAVIN (B_2)

DIABETOGENICITY

Under-nutrition

+

Root Crops (Staple)

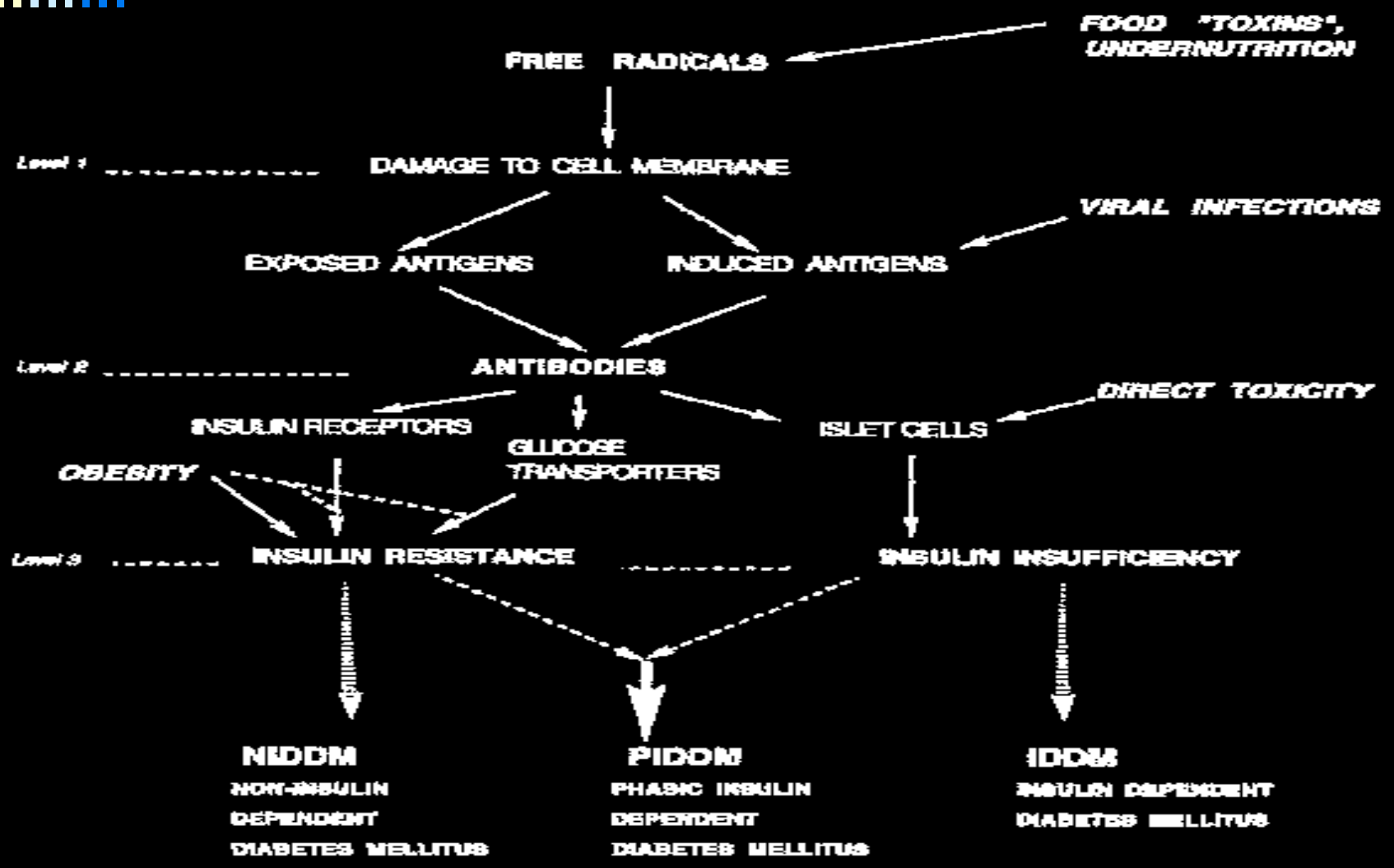
& / or

Bush Teas (CAM)

THE CENTRAL DOGMA CASCADE

CAUSE !?

The Unitarian Hypothesis



Herein lies the epitome of WISDOM

May we like him ponder upon these thoughts!

and the work goes on…..

….thanx much!