



REGIONE BASILICATA

BIOSISTEMI

Prof. Gianfranco Peluso

Matera, 17 luglio 2024

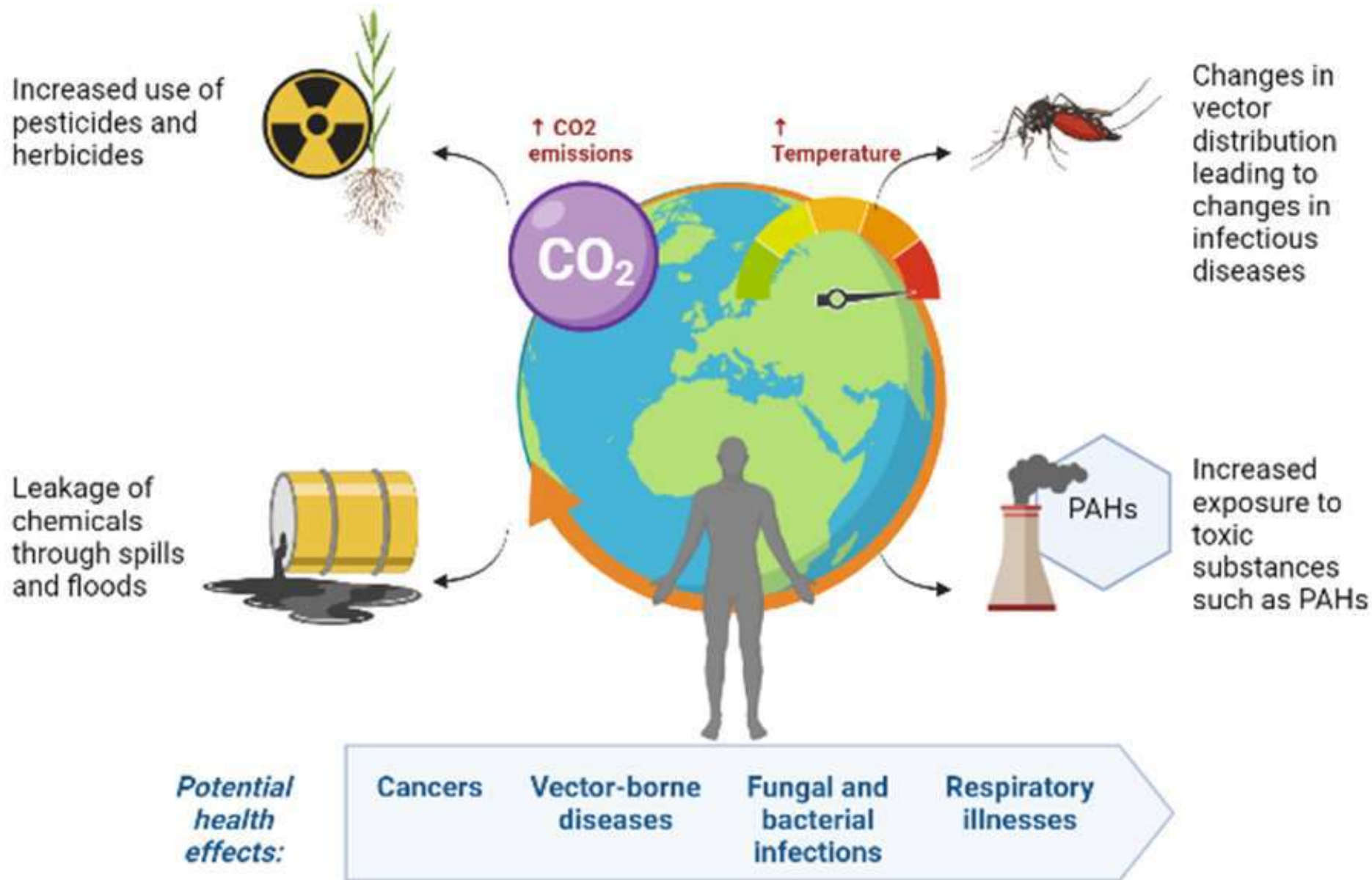
Quantum mechanics and Werner Heisenberg

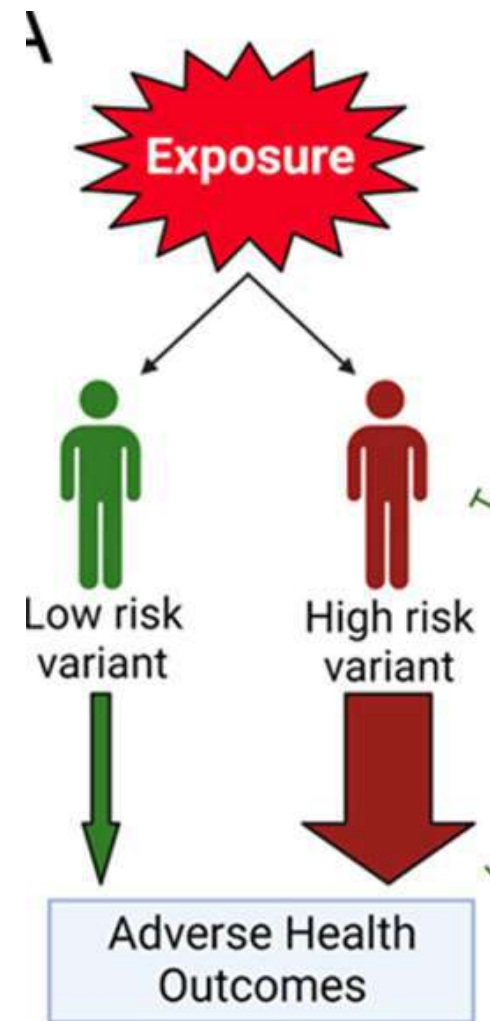
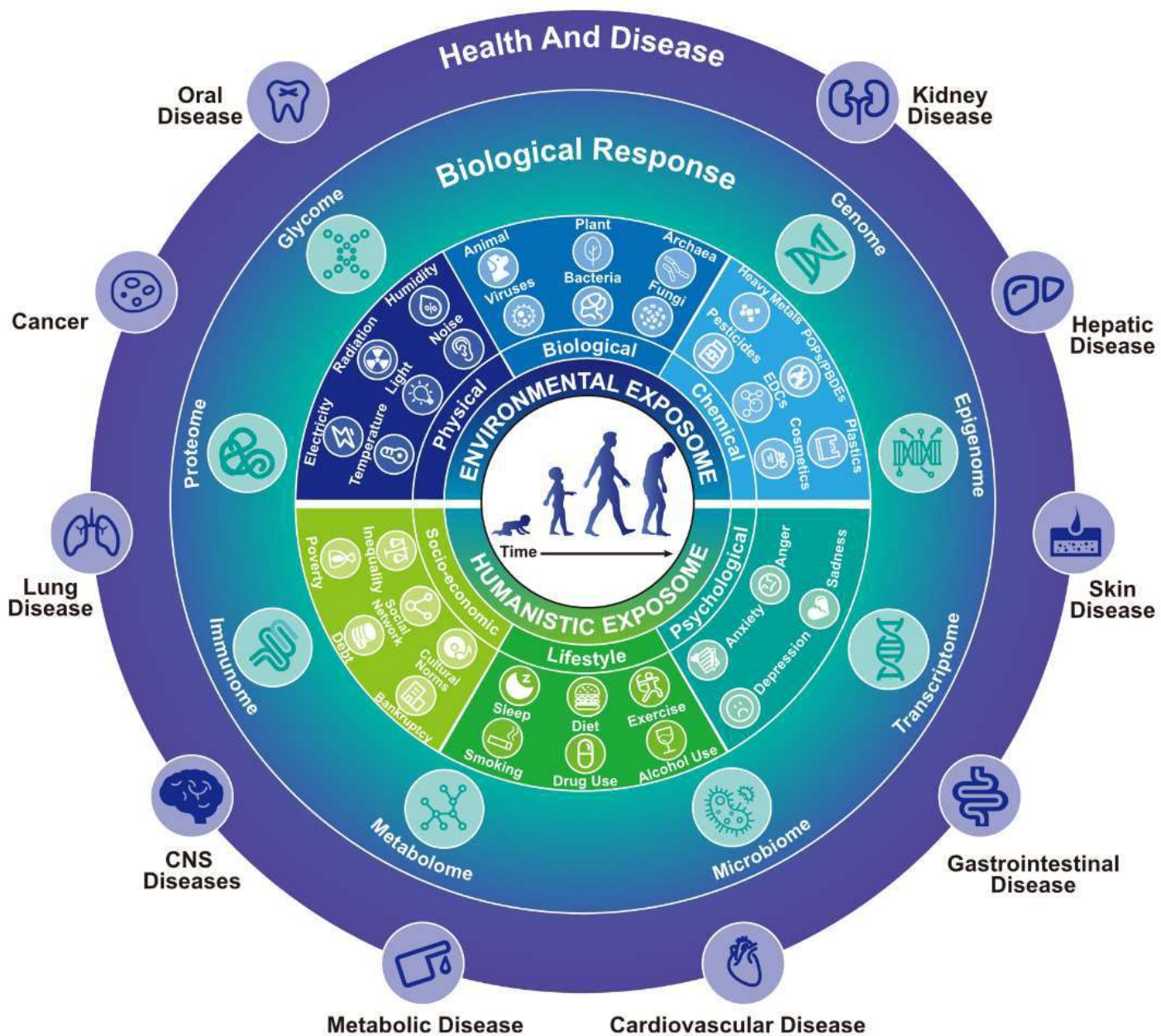
The **Heisenberg uncertainty principle** is a fundamental concept in quantum mechanics that states that there is a limit to the precision with which certain pairs of physical properties, such as position and momentum, can be simultaneously known.

$$\Delta x \Delta p \geq \frac{\hbar}{2}$$

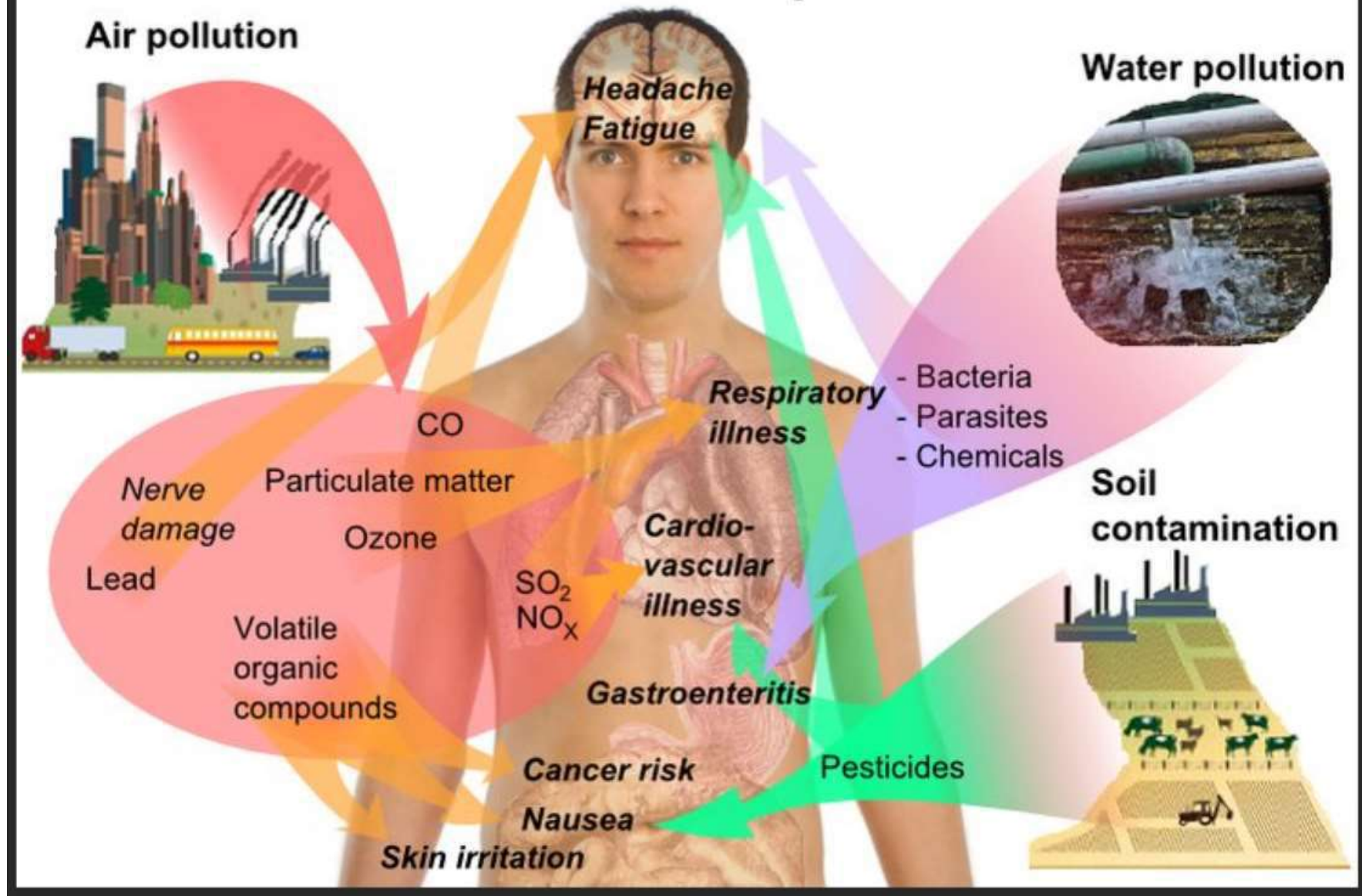
Δx is the uncertainty in position, Δp is the uncertainty in momentum, and \hbar is the reduced Planck constant

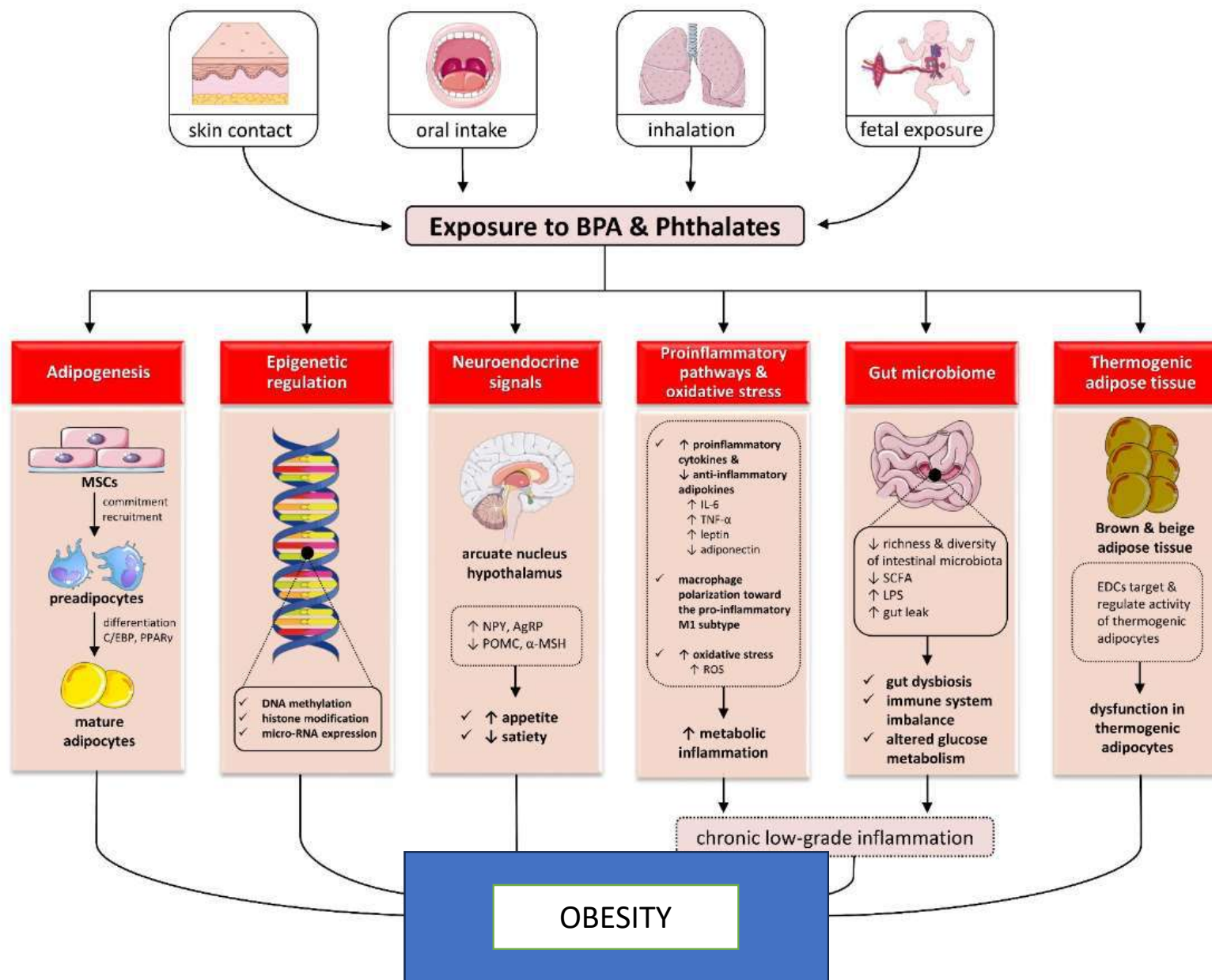
The uncertainty principle has far-reaching implications in quantum mechanics and has been used to explain a wide range of phenomena, from the stability of atoms to the behavior of subatomic particles. It is one of the cornerstones of modern physics and has been the subject of much research and debate since its discovery by Werner Heisenberg in 1927.

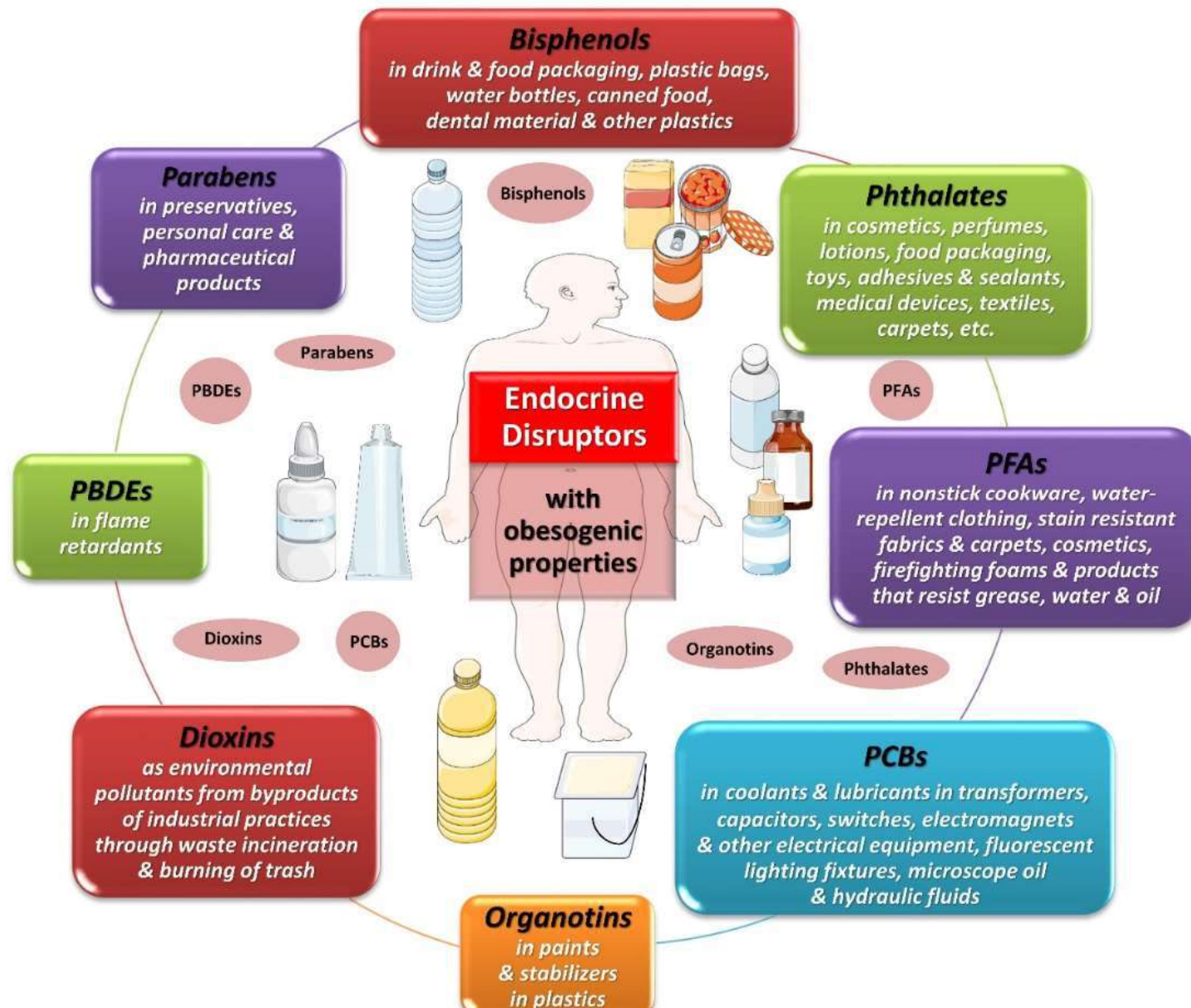


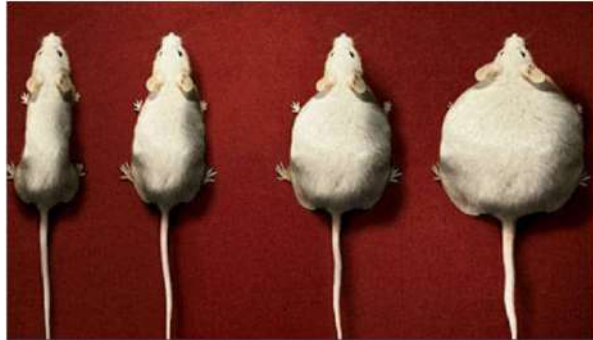


Health effects of pollution





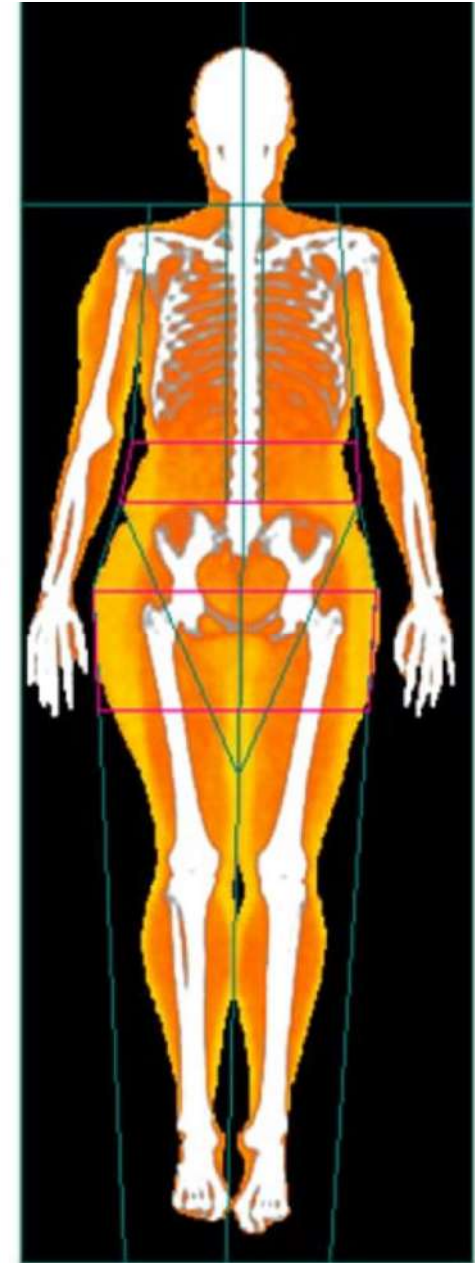




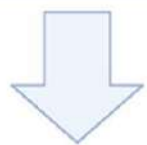
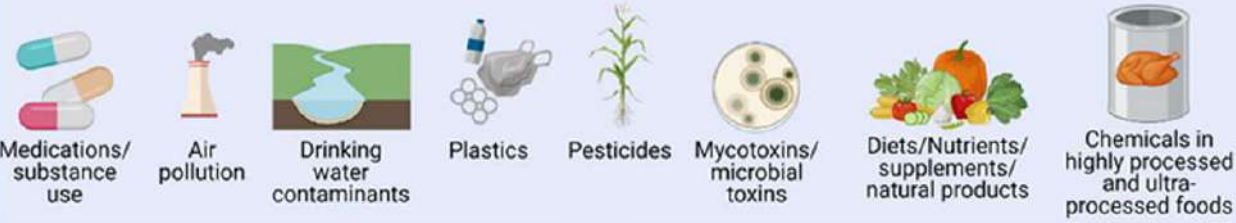
OBESOGENS

OBESOGENS ARE FOREIGN CHEMICAL COMPOUNDS THAT CAN DISRUPT THE NORMAL FUNCTION OF THE BODY AND MAKE YOU FAT

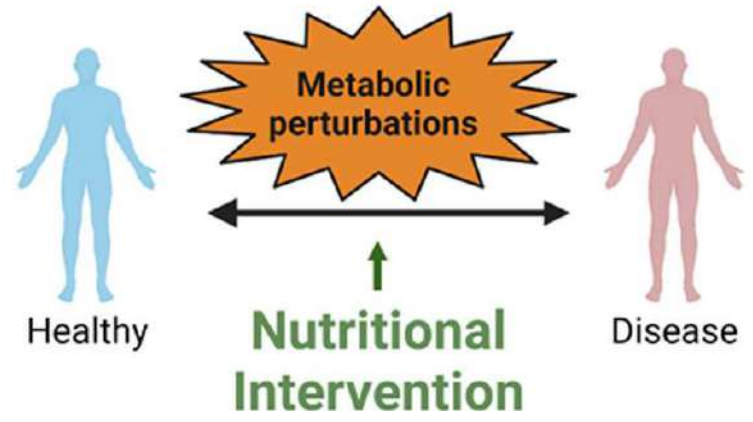
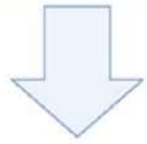
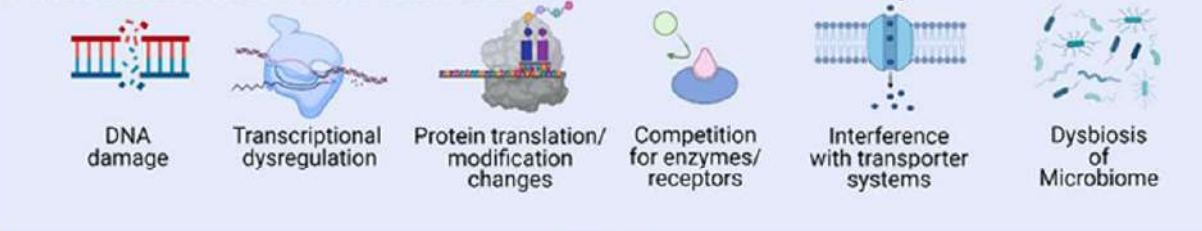
- BPA found in plastic bottles
- Perfluorooctanic Acid (PFOA) found mainly in non-stick (Teflon) pots and pans
- Microwave popcorn bags
- Fungicide tributyltin (TBT)
- Phthalates in scented lotion, shampoo, perfume, aftershave, nail polish, and hair spray
- Triclosan in Hand sanitizers, soaps, and toothpastes



Exposome



Perturbations of Host and Microbial Processes



EPIGENETICS

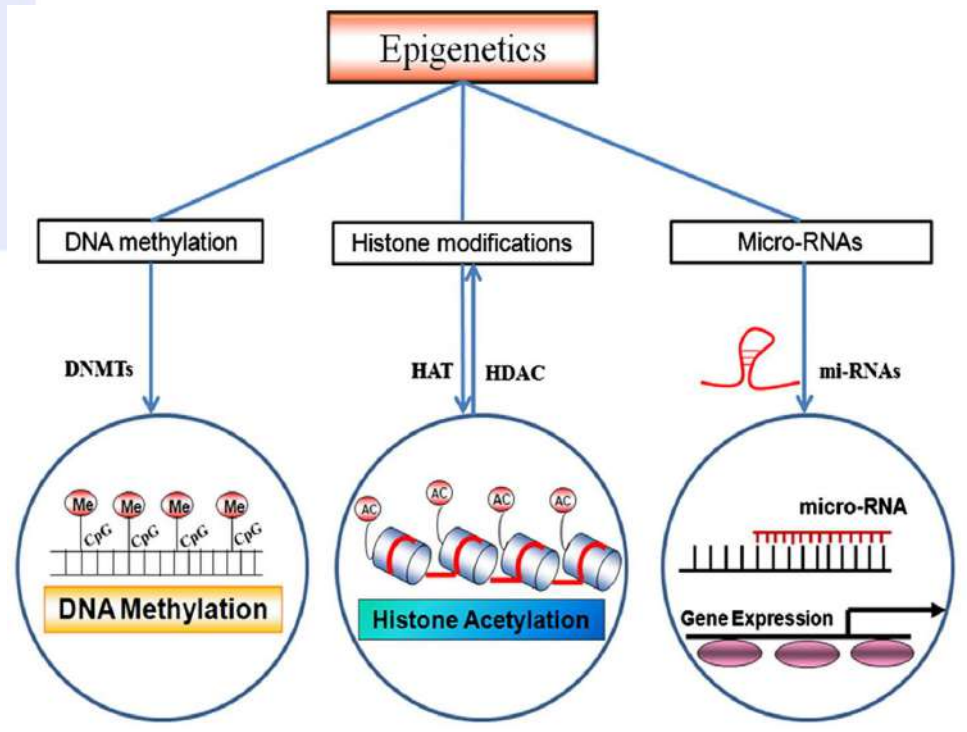


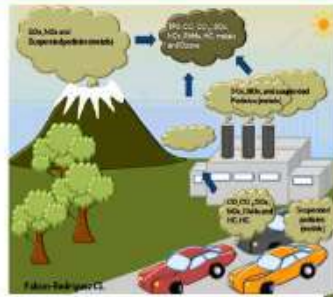


Figure 21.4
Genetics: A Conceptual Approach, Fifth Edition
© 2014 W. H. Freeman and Company



ENVIRONMENTAL POLLUTION

AIR POLLUTION



NO_x, O₃, SO₂ penetration by the stomata causing reactive oxygen species generation and stress in plants



Volatile organic Compounds and heavy metals get trapped into the epicuticular waxes. Upon entry into the plant cause cellular damage

Surface deposition of the particulate matter leading to clogging of stomata and other physiological disorders

WATER POLLUTION



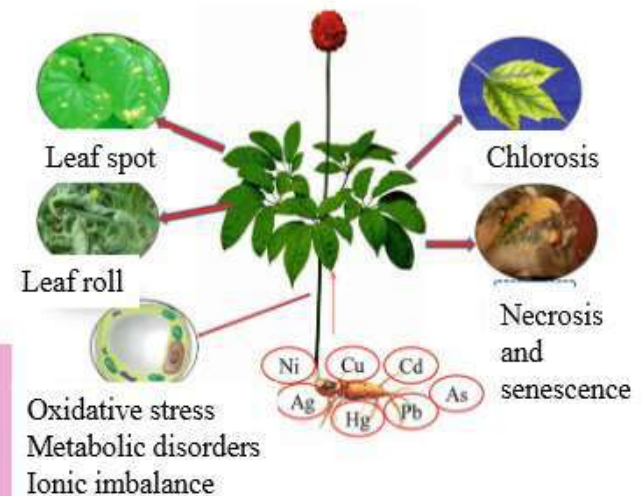
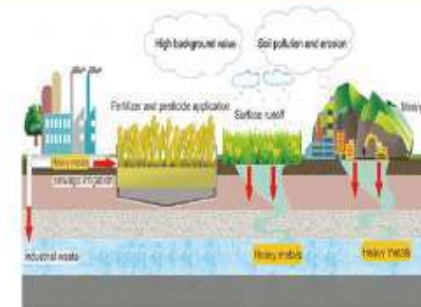
Industrial discharges, smelting and ore extraction processes leading to heavy metal contamination

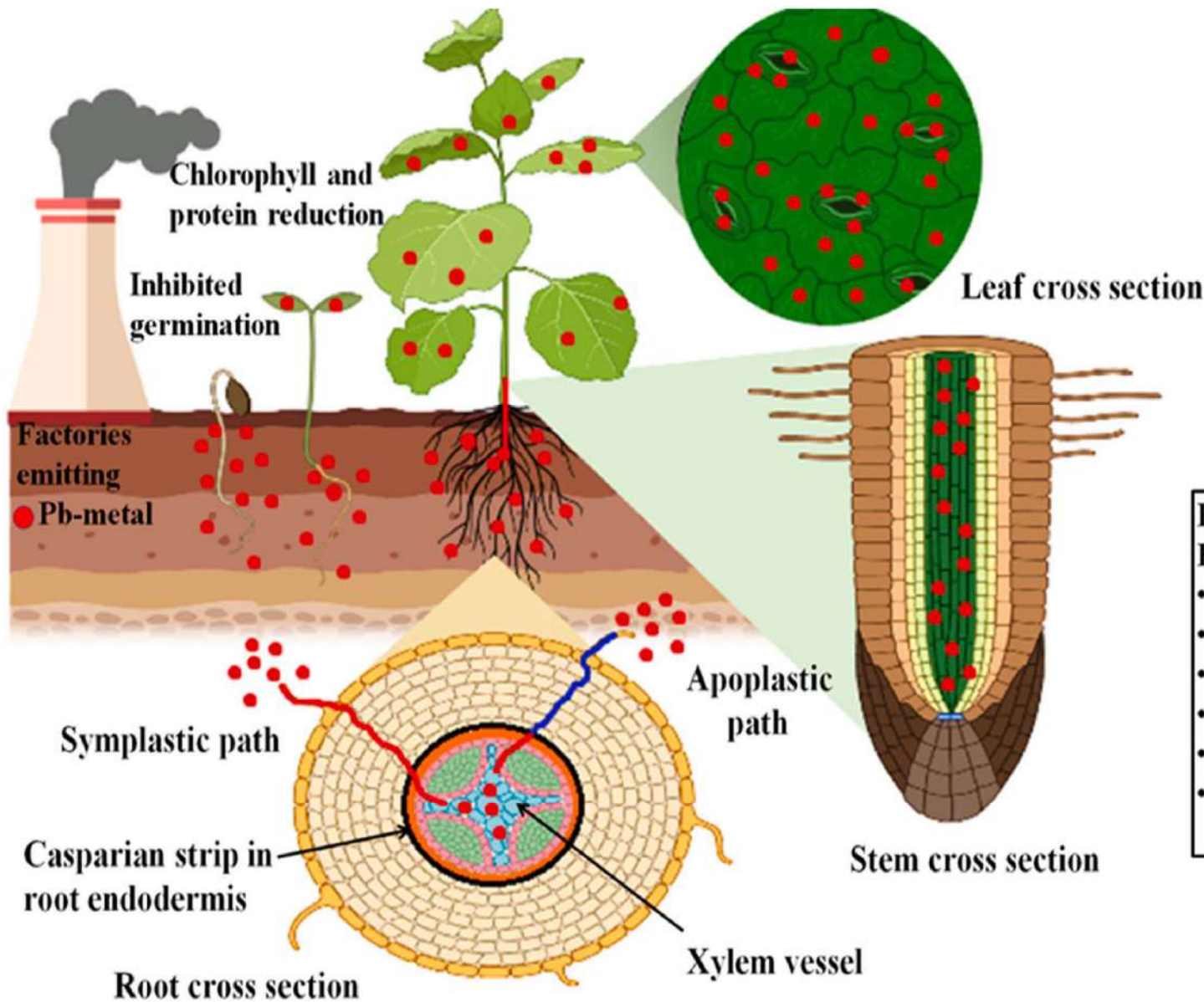
Degradation of water quality



Nutrient load increase due to fertilizers result in algal bloom, oxygen is depleted leading to the death of macrophytes and fishes

SOIL POLLUTION





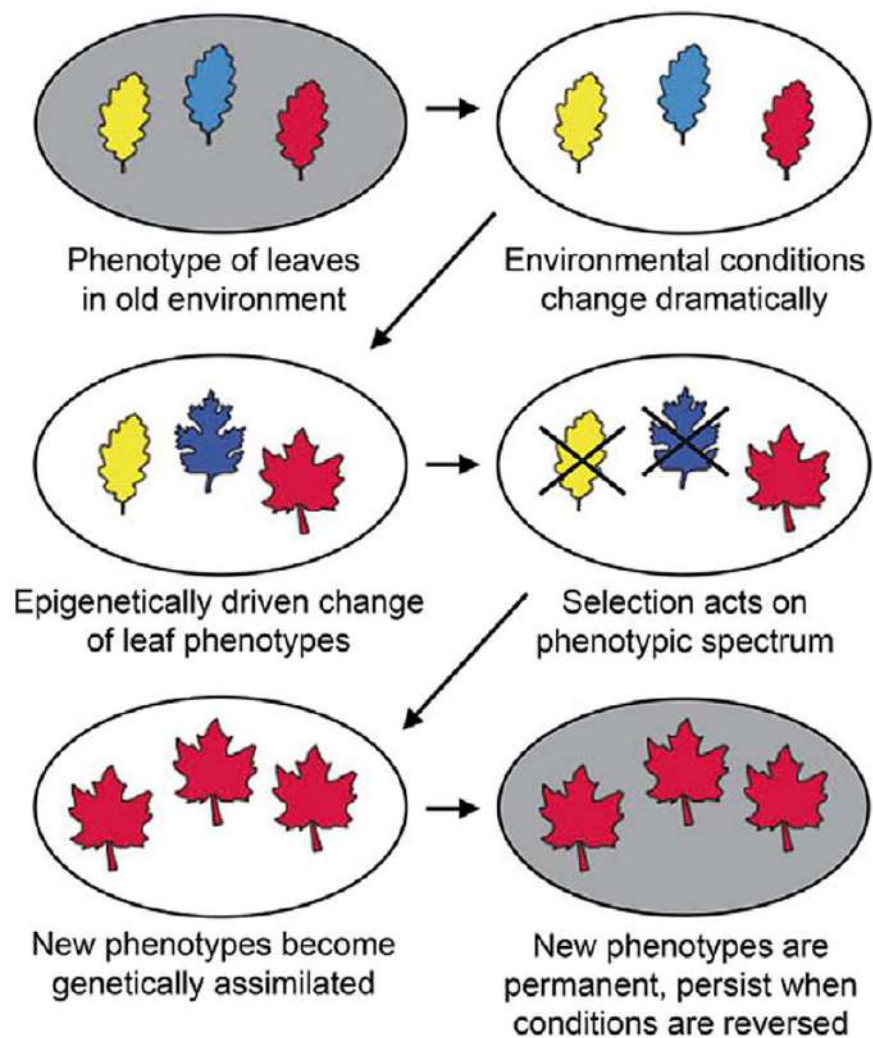
Reduction in Physiological Effects

- Seed germination
- Mineral nutrients
- Amino acids and Proteins
- Transpiration and Respiration
- Water Status
- Plant metabolism

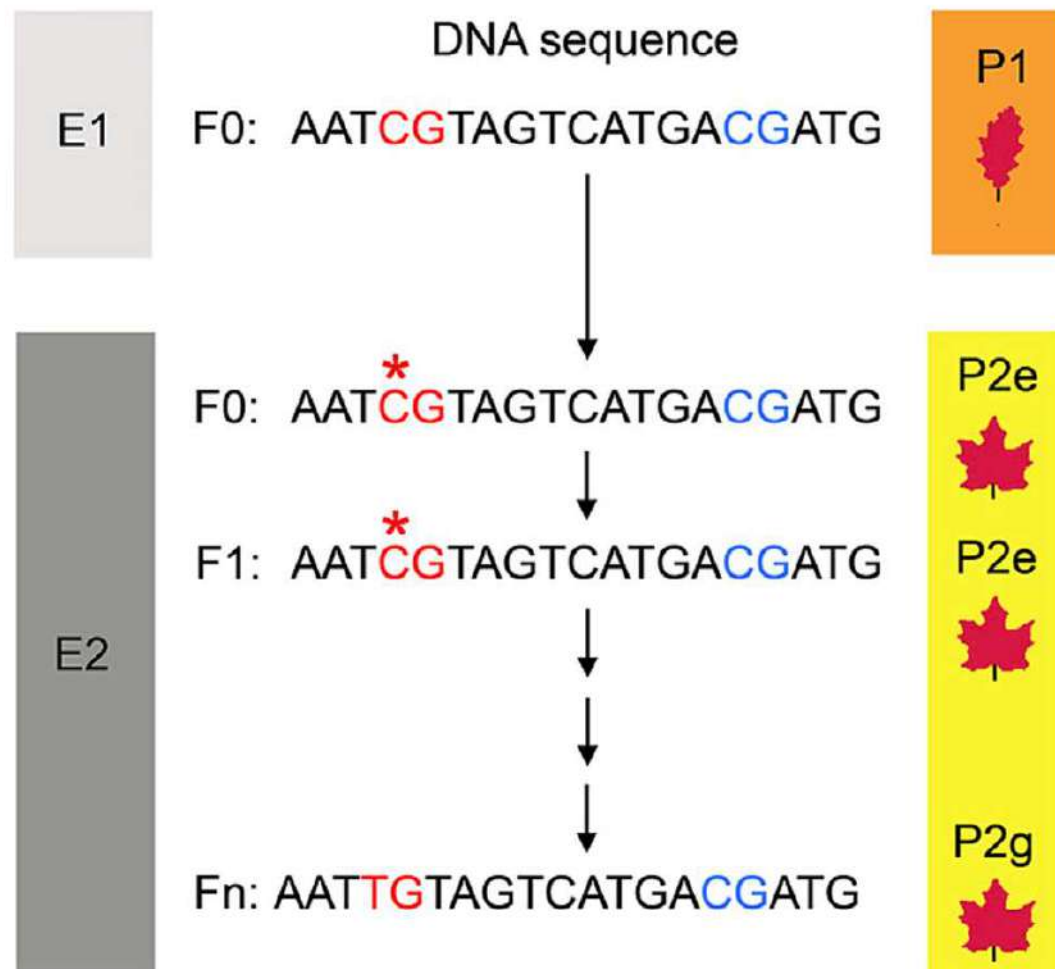
Biochemical and Molecular Effects

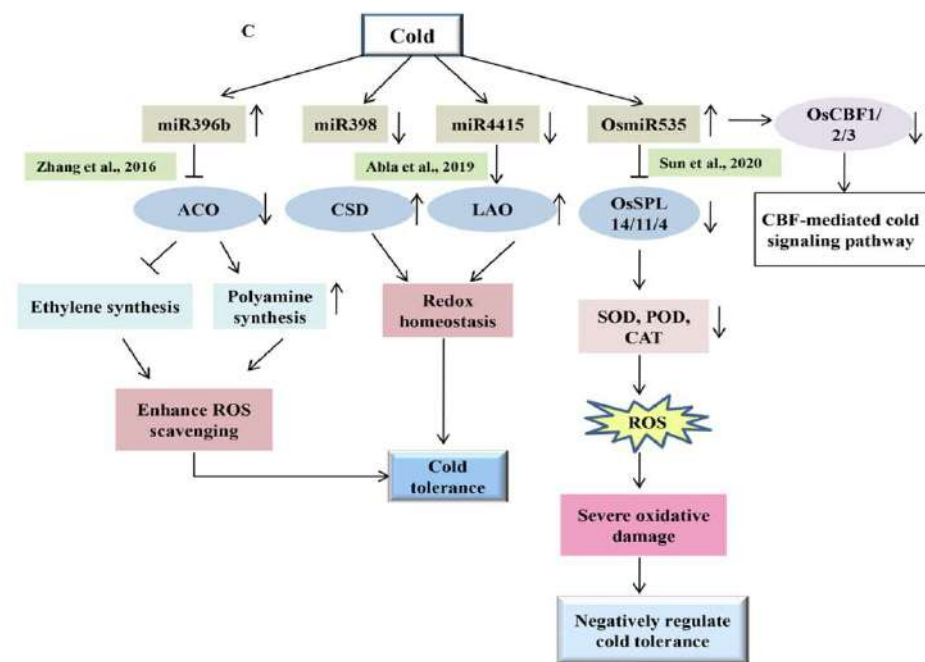
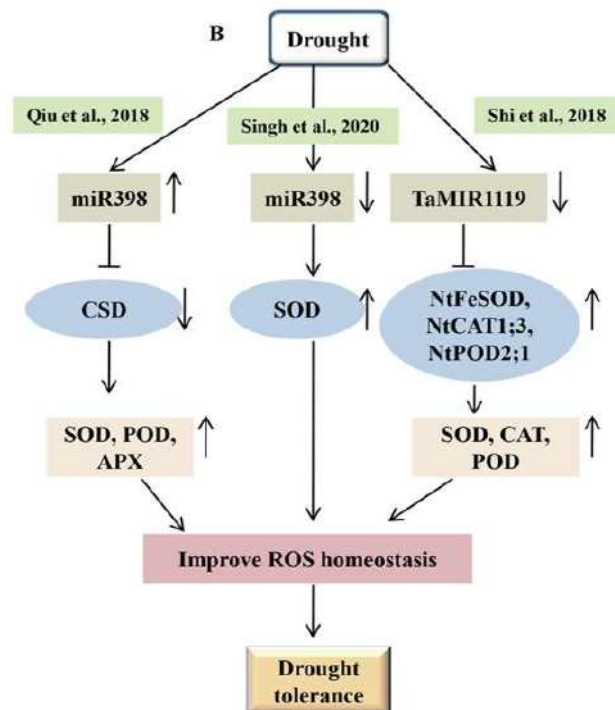
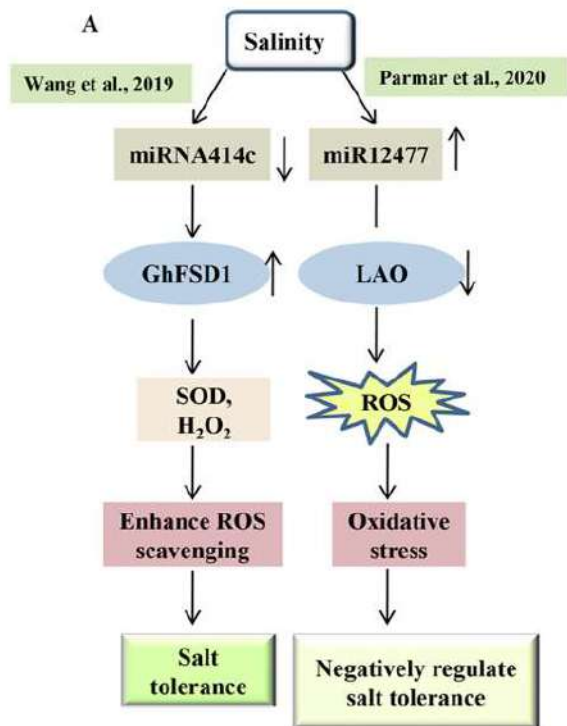
- Increase in membrane disruption
- Lessen Enzymes activities
- High ROS generation
- Results in DNA damage
- High phenolic compounds
- Necrosis

A



B





(A)

**Phytoextraction/
Phytoaccumulation**

Uptake and
accumulation of
metal in the shoots

**Phytotransformation/
Phytodegradation**

Transformation/
breakdown of
contaminants
within tissues



Phytovolatilization

Convert metal into
volatile form and
release into the
atmosphere through
leaf surfaces

Phytostabilization

Limiting the
mobility/inactivity
of metals into soil
by roots

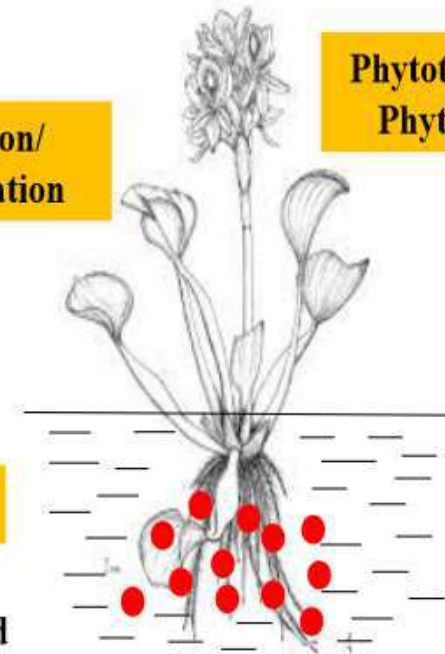
(B)

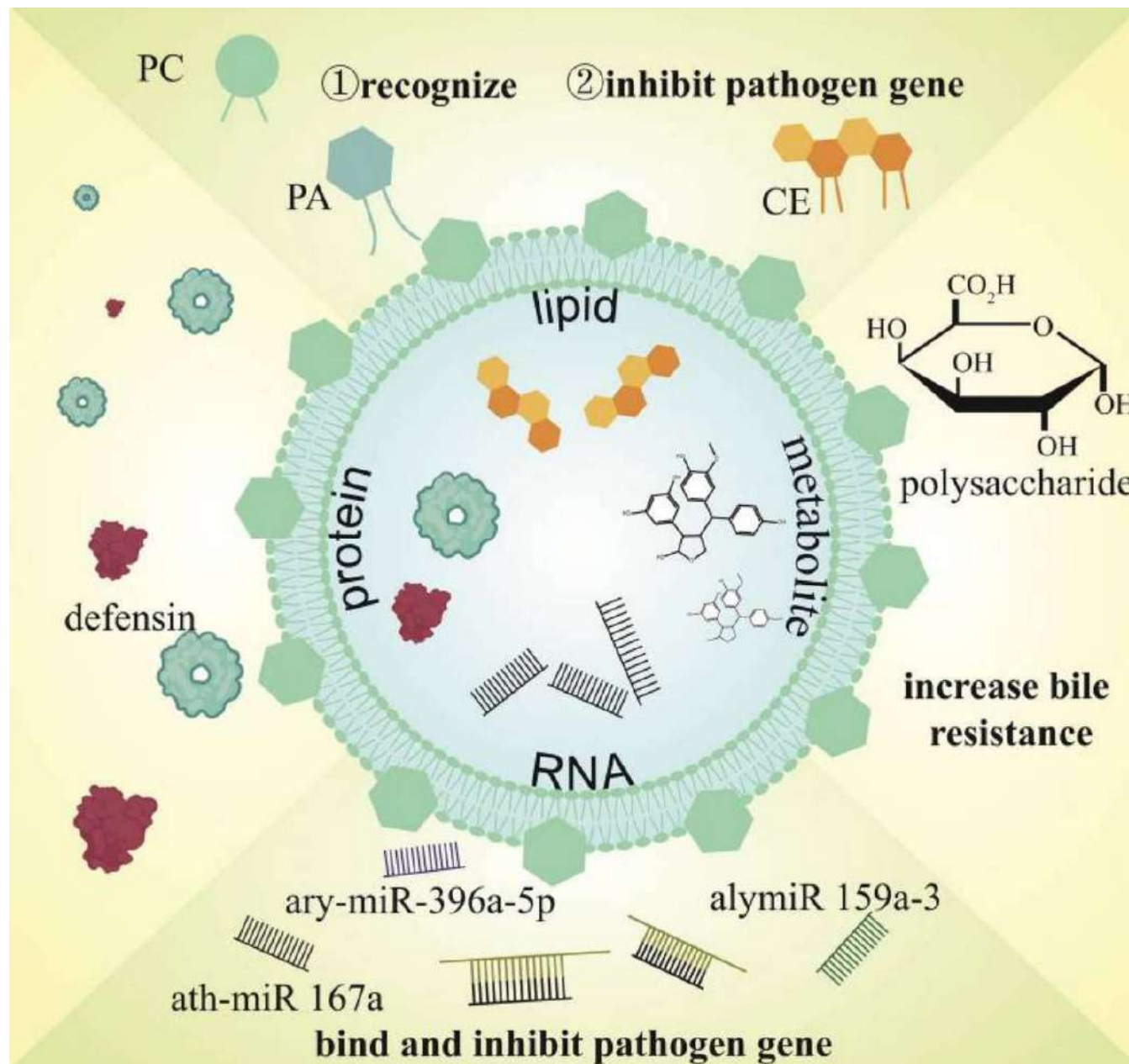
**Phytoextraction/
Phytoaccumulation**

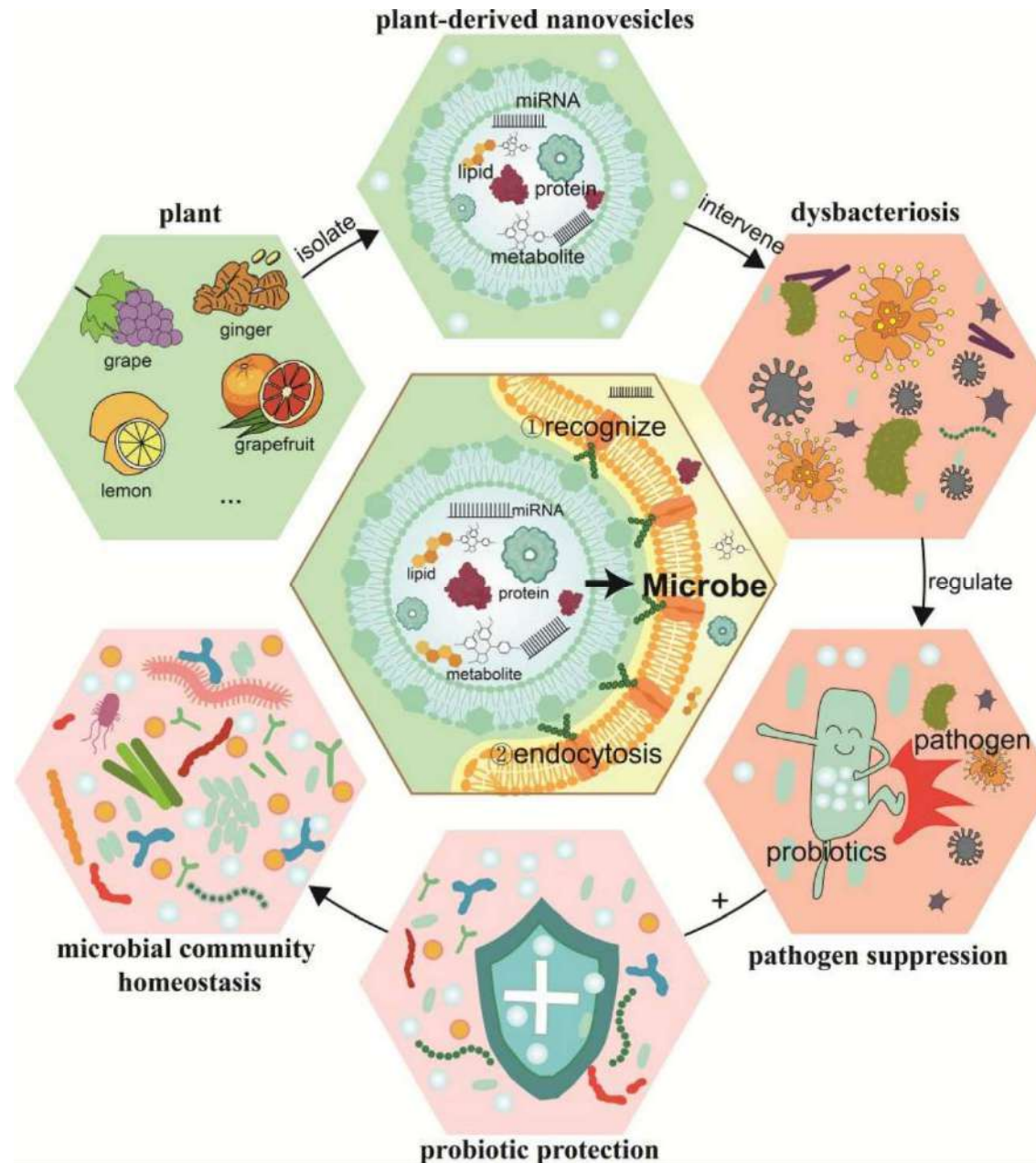
**Phytotransformation/
Phytodegradation**

Rhizofiltration

Absorption,
precipitation and
concentration of
metal pollutants by
the roots

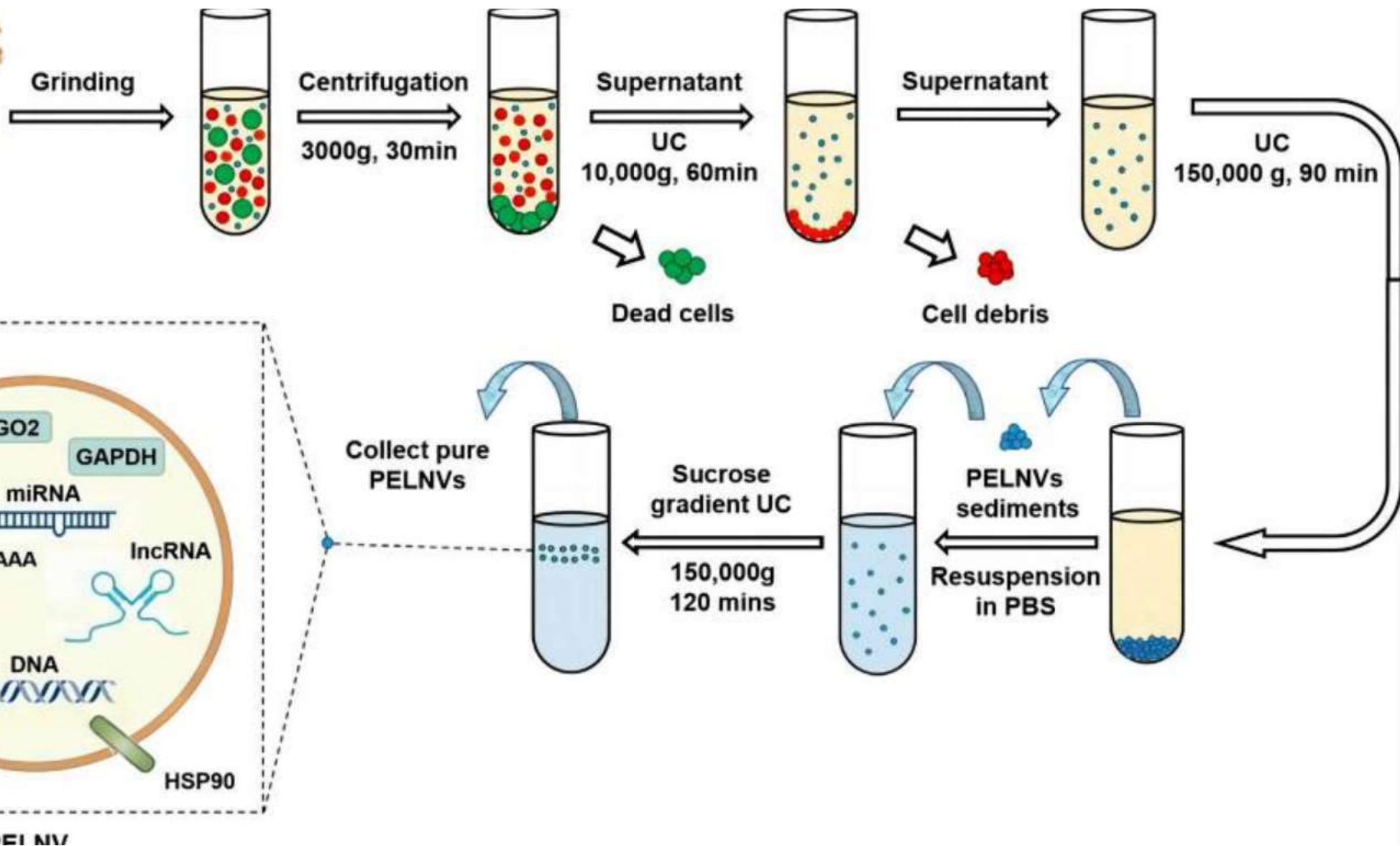




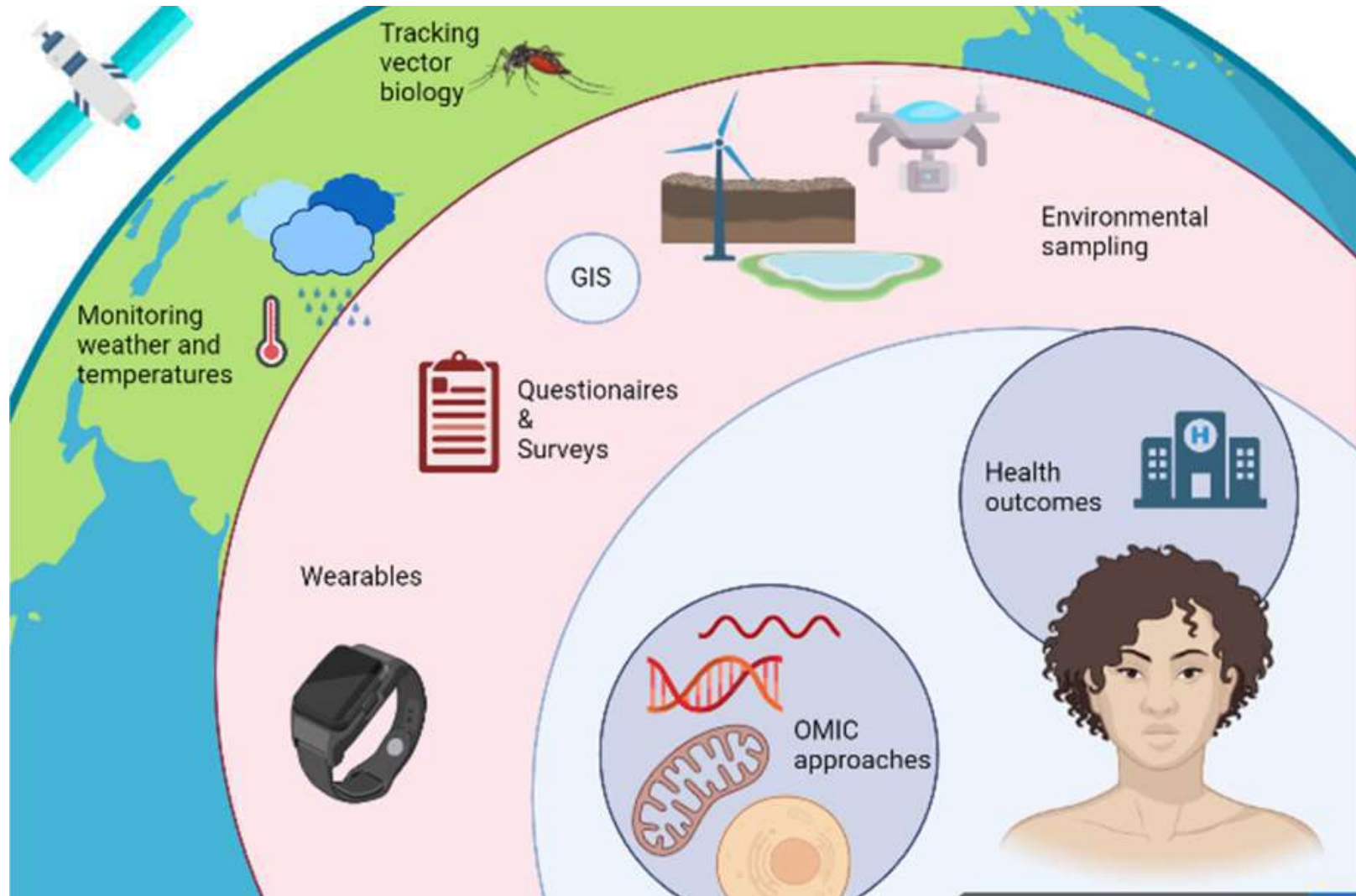




Plant source

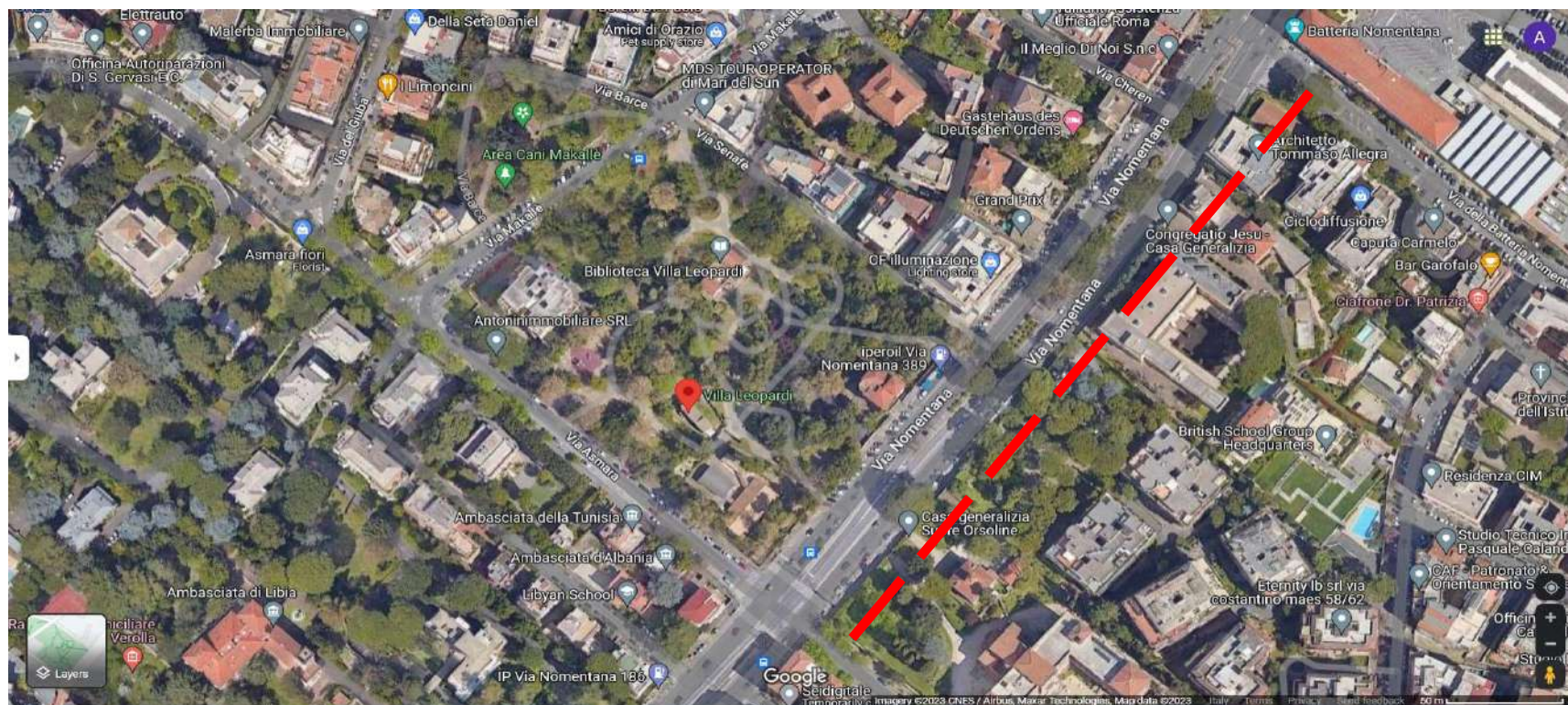


Climate change, human health, and the exposome: Utilizing OMIC technologies to navigate an era of uncertainty



SPOKE 6 Task 1.3 Impact of NBS on air quality and human exposure (case study 1) lead: CNR-IIA; partners: CNR-ISAC, UNINA

Experimental set up: test area (Villa Leopardi, Roma)



Agreement with
Rome Municipality
DONE

Air pollutants emission comes from a dominant source (vehicular traffic) and one preferential direction (Via Nomentana; other roads are minor and residential)

Exposome_NBS & Air Quality

Villa Leopardi, Luglio 2023

Installazione barriere verdi (luglio 2023) presso la cancellata di Villa Leopardi (15m)

Installazione di una barriera finta come controllo

Installazione di pannelli esplicativi, anche per gli "Amici di Villa Leopardi"

ACTIVITY 1
ESTABLISH A CAUSE-EFFECT
RELATIONSHIP
between NBS and AIR QUALITY



Salvia chamaedryoides
silver-leaved
Salvia "Wendy's Wish"
Salvia "Amante"
Pteris vittata
Viburnum lucidum
Buxus sempervirens
Nerium oleander
Photinia x fraseri
Elaeagnus ebbingei
Prunus laurocerasus
Geranium "Rozanne"
Sempervivum tectorum



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Спасибо

Singly

Chợ nổi Cái

คุณ Teso

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ขอขอบคุณ Teşekkür ederim