KING'S College LONDON

INSTITUTE OF PSYCHIATRY, PSYCHOLOGY & NEUROSCIENCE

Module:

Biological foundations of mental health

Week 2:

Building blocks of the brain

Dr Isabella Gavazzi

Topic 1
Neuron-glial interactions and mental health

Part 1a of 2

Introduction (1)

What is the biological basis of behaviour?

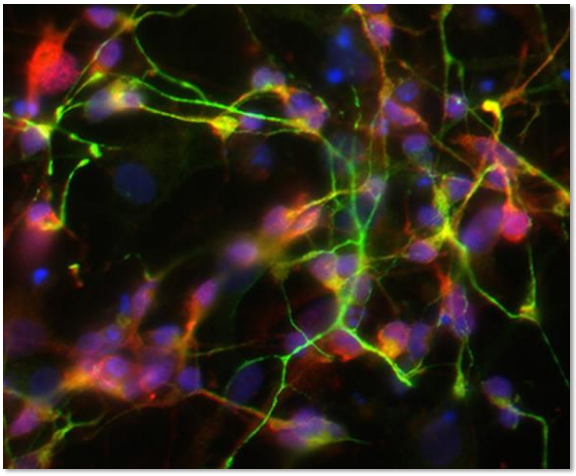

Figure 1: Neuron

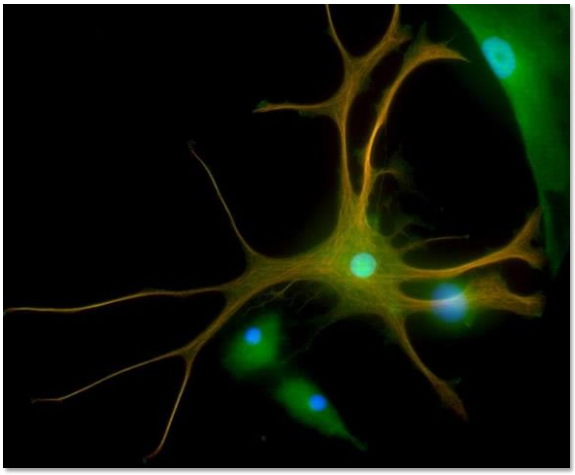

Figure 2: Glial cell (astrocyte)

Introduction (2)

Part 1: Astrocytes in the healthy CNS

- Astrocyte networks
- The modulation of synaptic function (the 'tripartite synapse')

Part 2: Astrocytes in CNS pathology

- Depression

Astrocytes in the Healthy Brain

Visualised first by the use of histological staining, such as the silver impregnation method, developed by Camillo Golgi, 1873

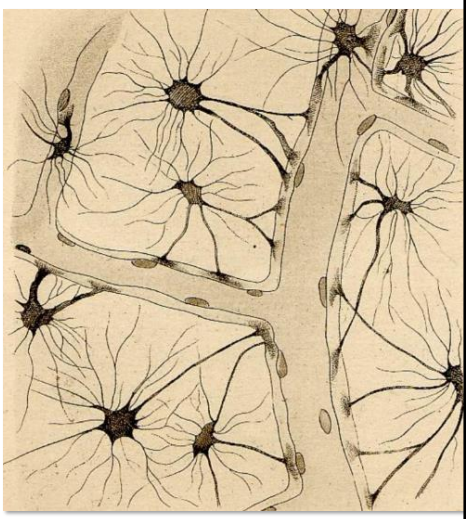

Figure 3: Astrocytes visualised by silver impregnation method

The rising stars of neuroscience

Do glial cells affect behaviour?

Mice are smarter with human astrocytes!

- perform better in cognitive tests
- show enhanced long term potentiation (LTP) of synapses

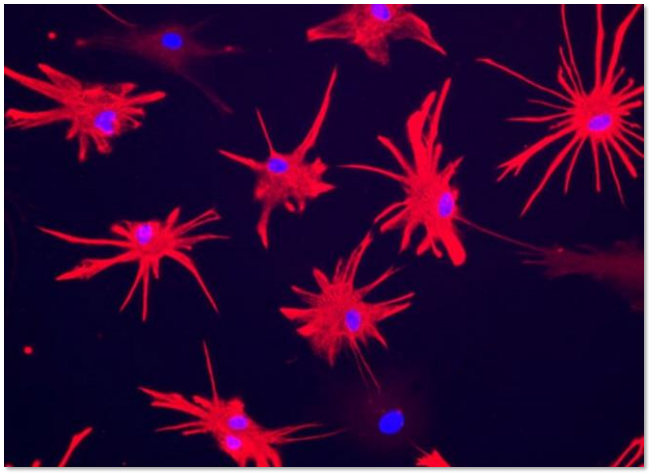

Figure 4: Human astrocytes

How can astrocytes affect behaviour?

- Homeostatic role
- Ability to release neurotransmitters (gliotransmission)
- Formation of astrocytic networks

Gliotransmission and the tripartite synapse

Ca++ increases in astrocytes elicit the **regulated** release of gliotransmitters e.g.

- glutamate
- GABA
- ATP and adenosine (purines)
- D-serine

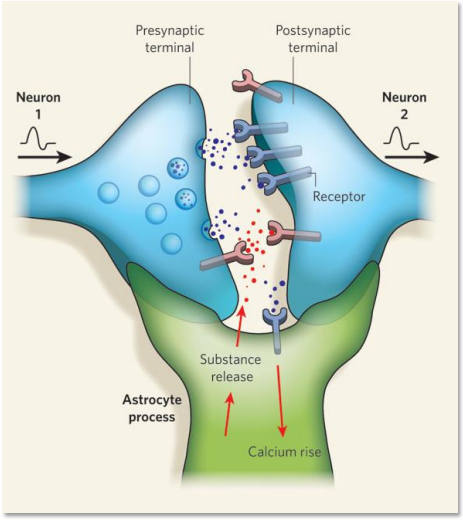

Figure 5: The tripartite synapse