

B. Pharm IInd year

Pharmacology-I

Aim: Commonly Used Instruments in Experimental Pharmacology

Reference: A Handbook of Experimental Pharmacology, By S.K. Kulkarni, Vallabh Prakashan.

Introduction:

Experimental pharmacology relies on a plethora of instruments to study the effects of drugs on living organisms. These instruments facilitate the measurement of physiological responses, behavioral changes, and biochemical parameters, providing insights into drug mechanisms, efficacy, and safety profiles. Here, we delve into some commonly used instruments in experimental pharmacology, including Student's organ bath, rota rod apparatus, Eddy's hot plate, analgesiometer, and electroconvulsimeter, among others.

1. Student's Organ Bath:

- **Description:** Student's organ bath is a classical instrument used to study the contractility of isolated smooth muscle preparations, such as the ileum, trachea, or vas deferens.

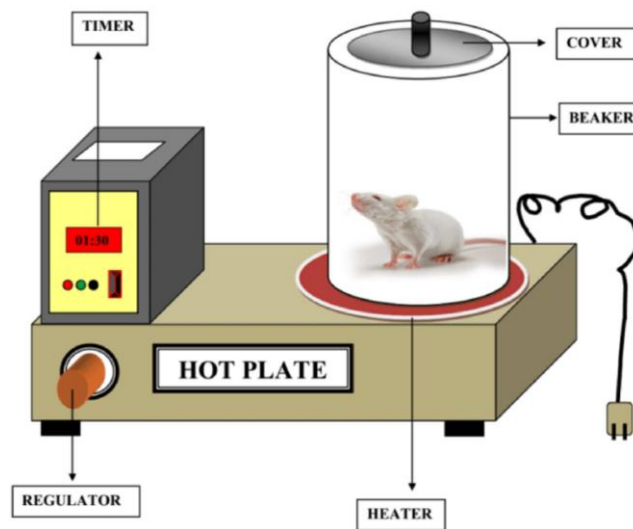
- **Principle:** It consists of a tissue chamber filled with physiological solution, where the isolated tissue segment is mounted and connected to force transducers for recording contractile responses.

- **Applications:** Student's organ bath is utilized to investigate the effects of drugs on smooth muscle contraction, relaxation, and receptor-mediated responses. It is commonly employed in pharmacological research related to gastrointestinal, respiratory, and urogenital systems.

- **Description:** Eddy's hot plate is a temperature-controlled surface used to assess nociceptive responses and analgesic effects in animals.

- **Principle:** Animals are placed on the heated surface of the hot plate, and their response latency to nociceptive stimuli, such as paw licking or jumping, is measured.

- **Applications:** Eddy's hot plate is commonly employed in pharmacological studies to evaluate the analgesic properties of drugs, including opioids, nonsteroidal anti-inflammatory drugs (NSAIDs), and centrally acting analgesics.

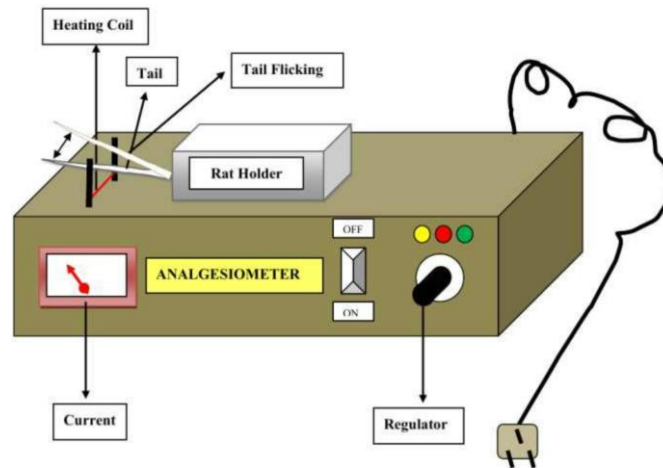


4. Analgesiometer:

- **Description:** Analgesiometer is a device used to measure pain sensitivity or nociceptive threshold in animals by applying mechanical pressure or thermal stimuli to specific body regions.

- **Principle:** Animals are subjected to controlled pressure or heat stimuli, and their nociceptive responses, such as withdrawal reflexes or vocalizations, are quantified.

- **Applications:** Analgesiometers are utilized in pharmacological research to assess the analgesic efficacy of drugs and investigate pain mechanisms in various models of acute and chronic pain conditions.



5. Electroconvulsimeter:

- **Description:** Electroconvulsimeter is an instrument used to induce and measure electroconvulsive seizures in animal models, primarily rodents.
- **Principle:** Electrical stimulation is delivered to the brain via electrodes implanted or applied to the animal's scalp, leading to generalized tonic-clonic seizures.
- **Applications:** Electroconvulsimeters are employed in preclinical studies to investigate the neurobiology of epilepsy, screen potential antiepileptic drugs, and explore mechanisms underlying seizure induction and termination.

ELECTRO CONVULSIOMETER



6. Actophotometer:

- **Description:** An actophotometer is a device used to quantify the locomotor activity and exploratory behavior of animals, typically rodents, in an enclosed environment.
- **Principle:** The actophotometer consists of an activity chamber equipped with photocells or infrared sensors that detect movements and interruptions in light beams caused by animal

motion. The data collected are then analyzed to determine parameters such as total distance traveled, velocity, and frequency of movement.

- **Applications:** Actophotometers are commonly employed in behavioral pharmacology and neuroscience research to assess the effects of drugs on motor activity, circadian rhythms, anxiety-related behavior, and drug-induced locomotor changes. They are also utilized in preclinical studies of psychiatric disorders, drug addiction, and neurodegenerative diseases to evaluate the efficacy of pharmacological interventions and elucidate underlying neurobiological mechanisms.



7. Pole Climbing Apparatus:

- **Description:** A pole climbing apparatus is a specialized instrument used to evaluate motor coordination, balance, and climbing ability in rodents, particularly mice and rats.

- **Principle:** The apparatus typically consists of a vertical pole with a rough or textured surface, which the animal is encouraged to climb. The time taken by the animal to climb to a specified height or reach a platform is recorded as a measure of motor performance and coordination.

- **Applications:** Pole climbing apparatus is commonly employed in behavioral pharmacology to assess the effects of drugs on motor function, coordination, and balance, as well as in studies of neurodegenerative disorders, movement disorders, and drug-induced impairments. It provides valuable insights into the neurobiological mechanisms underlying motor behavior and locomotor control in preclinical models.

**Conclusion:**

These instruments represent a subset of the diverse array of tools utilized in experimental pharmacology to study drug effects, physiological responses, and disease mechanisms in preclinical models. By employing these instruments, researchers can elucidate the pharmacological properties of drugs, evaluate their therapeutic potential, and contribute to the development of novel treatments for various medical conditions.