People's **D**emocratic **R**epublic of **A**lgeria

Ministry of **H**igher **E**ducation and **S**cientific **R**esearch

University Center Abdelhafid Bossof – Mila

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Scientific English Handout

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FOR THIRD YEAR BIOCHEMISTRY STUDENTS

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Lecture 1: Paragraph Writing

I/ Definition

A paragraph is a sentence or group of sentences that support one main idea. It is a series of sentences that are organized and coherent, and are all related to a single topic.

In academic writing, a paragraph is often between five and ten sentences long but it can be longer or shorter, depending on the topic.

Paragraphs can contain many different kinds of information. A paragraph could contain a series of brief examples or a single long illustration of a general point. It might describe a place, character, or process; narrate a series of events; compare or contrast two or more things; classify items into categories; or describe causes and effects. Regardless of the kind of information they contain, all paragraphs share certain characteristics. One of the most important of these is a topic sentence.

A paragraph has three basic parts: the topic sentence, the supporting sentences, and the concluding sentence.

1. The topic sentence: it is the main idea of the paragraph. It is usually the first sentence of the paragraph, and it is the most general sentence of the paragraph.

2. The supporting sentences: these are the sentences that talk about or explain the topic sentence. They are more detailed ideas that follow the topic sentence.

3. The concluding sentence: this may be found as the last sentence of the paragraph. It can finish a paragraph by repeating the main idea or just giving a final comment about the topic.

II/ Qualities of a Good Paragraph

1. UNITY: all the detail sentences clearly point to or support the topic sentence.

2. COHERENCE: all the sentences and ideas in the paragraph flow smoothly together to make clear and logical points about the topic.

Coherence can be achieved through the use of:

a. Natural or easily recognized order.

b. Transition words and phrases - used to show the connection from one sentence to another, or to signal a new train of thoughts.

c. Repetition of Key Words - important words or phrases (and their synonyms) may be repeated throughout a paragraph to connect the thoughts into a coherent statement.

3. Order: Order refers to the way you organize your supporting sentences. Whether you choose chronological order, order of importance, or another logical presentation of detail, a solid paragraph always has a definite organization. In a well-ordered paragraph, the reader follows along easily, aided by the pattern you've established. Order helps the reader grasp your meaning and avoid confusion.

4. Completeness: Completeness means a paragraph is well-developed. If all sentences clearly and sufficiently support the main idea, then your paragraph is complete. If there are not enough sentences or enough information to prove your thesis, then the paragraph is incomplete. Usually three supporting sentences, in addition to a topic sentence and concluding sentence, are needed for a paragraph to be complete. The concluding sentence or last sentence of the paragraph should summarize your main idea by reinforcing your topic sentence.

Lecture 2: Parts of the Scientific Article

- **Title:** briefly states what the article is about.
- **Abstract** summarizes the whole article.
- **Introduction** establishes the context for the research: the area in which the research takes place, the research problem, the importance of the research, and the guiding question or hypothesis.
- **Materials and Methods** describe the research procedure.
- **Results** report the outcomes of the research procedure.
- **Discussion** interprets the results, explaining them and comparing them to the results of other experiments.
- **Conclusion** focuses the reader on what is important about the research, its contribution to the larger area of study.
- **References** list the sources used in the article.

Lecture 03: How to Write a Lab Report

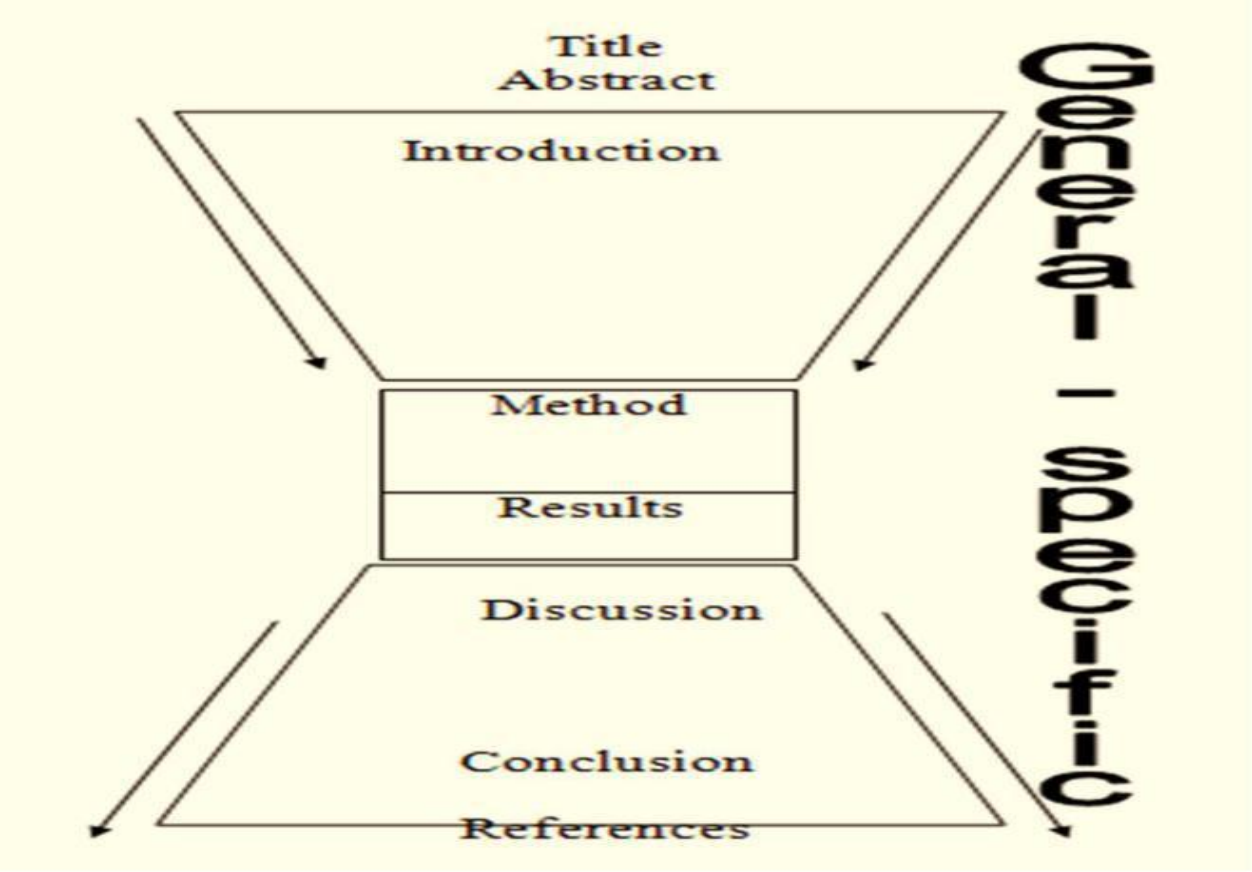
I/ What Is A Lab Report?

Lab reports are written to describe and analyse a laboratory experiment that explores a scientific concept. In a lab report you explain what you did in your experiment, what you learned, and what the results meant.

Basics:

- Arial; 11 or 12 point
- 1.5 line spacing
- Print on A4
- 1500-2000 words

II/ Structure of a Lab Report



A/ Title Page :

Do	Don't
Explain what the experiment involves in a long phrase (be specific!)	One word titles: 'Chromatography' or 'Enzymes'
The effect of… **The influence on…**	Use phrases such as: "An experiment to show ..." " A study of..." " An investigation into..."
Include the title on the front cover and first page	

B/ Abstract

What's the difference between an abstract and an introduction?

- Abstracts are shorter (usually 150-200 words)
- The abstract is an overview of the whole report
- Abstracts show the reader the main findings of the report

Do	Don't
Summarise the whole report in one paragraph	Use references
Write it to stand alone as a description of the whole study	Refer to the report's structure
Write it last	Include statistics
Keep it short (150-200 words) **Remember it is not an introduction**	Include abbreviations

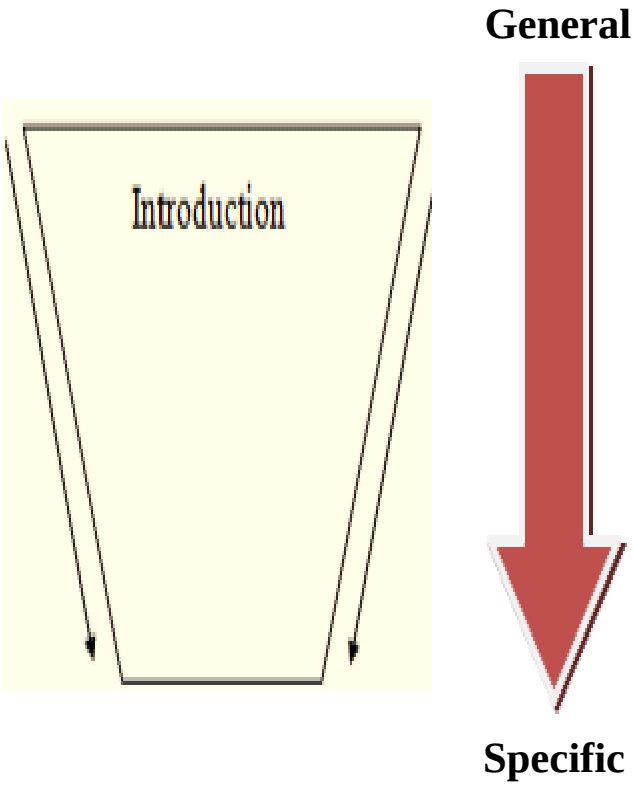
Language of Abstracts:

1. Full sentences
3. Impersonal passive ("The acid was applied")
4. Avoid negatives (not, no)
5. Avoid abbreviations, symbols and any other language 'shortcuts'.

C/ Introduction

- Introduce the area and previous research in the area
- Indicate a gap in the previous research; include why there was a need to conduct the experiment(s)
- Outline the purpose and relevance of the experiments

End with the aims



- Outline the claims about statements from other research (use 'that'):
  - ✓ The … theory indicates that acids are…
  - ✓ The … theory confirms that acids are…
  - ✓ Smith and Wilson (2009) state that …

✓ Smith and Wilson (2009) argue that …

D/ Aims

Aims can be written like this:

- 3 – 5 bullet points
- Statements of scientific intentions
- Use 'strong' sentence (the infinitive):

✓ To investigate…

✓ To analyse…

✓ To determine whether…

E/ Methodology

The purpose of methodology is to explain to the reader, for possible replication, the process(es) of your experiment.

What type of information is included in a methodology?

–Sample information, materials, procedures, rationale, problems~solutions…

What type of language is used when writing a methodology?

–Past tense (usually), description, factual – no analysis

Do	Don't
Use paragraphs	Use bullet points
Depersonalise: –*The liquid was transferred*	Personalise: –I/We transferred the liquid
Explain what was done	Write instructions
Give enough detail for replication	
Illustrate & write	

You may wish to include the following elements in your methodology:

- Place, time and date
- Whether you replicated a previous methodology
- Sample
- Sampling rationale (how it was chosen)
- Limitations (for example, a small sample)
- Procedure
- Data collation
- Data analysis

F/ Results

The Results section should be clear and easy to follow – however, some students make the mistake or either writing too much or only including illustrations. A good Results section will be a well balanced mix of both illustration and explanation.

Some top tips:

1. Start with an overall summary of the results
2. Do not begin with an illustration
3. Label graphs/tables (table 1… graph 3…)
4. Refer to illustrations in your text (table 1 shows…)
5. Use complete sentences
6. Describe statistics, not raw data
7. DO NOT INTERPRET (yet)!

Results Structure

- Start with an introduction – describe your results in general, before giving a more detailed description.
- In the main body, use paragraphs to detail your results with illustrations to support

- Help the reader by using 'locating statements', such

  as: *–…as can be seen in graph 1…*

–Table 6 shows that…

–As illustrated in figure 3…

–The effect of heat can be seen in the results of chart 2…

- Highlighting statements: evident, occurrences, trends

G/ Discussion

What is the difference between the Discussion and the Results section?

It is in the discussion that you can begin to interpret your results. If the Methodology is concerned with how, the Results with what, then the Discussion is concerned with why.

You do not need to discuss all your results in the Discussion section. However, you must make sure that any results you do interpret in the Discussion were also clearly explained in the Results section

- Logical **interpretation** of results (What do they tell you? What happened /didn't happen? Why?)
- **Speculation** (might, could, may, should, may be deduced that, this suggests that..)
- Link results to theoretical framework. (Discuss results in relation to previous research: **cite references**)
- Identify **limitations** of your experiment.
- **Implications** for future researchers? Or generally?

H/ Conclusions & Reference List

Conclusions:

Do	Don't
Use paragraphs	Include any new information or any new aspects of results or any new interpretation
Keep each paragraph to one point only	

Reference List: alphabetical list of references

Lecture 4: Reading Techniques

The four main types of reading techniques are the following:

- Skimming
- Scanning
- Intensive
- Extensive

1. Skimming

Skimming is sometimes referred to as gist reading. It may help in order to know what the text is about at its most basic level.

Skimming will certainly save you a lot of time. But it is not the best way to read because your comprehension will be lowered.

However, skimming is useful when your goal is to preview the text to get a better idea of what it's about. It will help prepare you for deeper learning. This completely prepares your brain to have an overview of what this text is about. You can then go on to use scanning to find specific important ideas.

2. Scanning

Scanning involves getting your eyes to quickly scuttle across sentence and is used to get just a simple piece of information. Pay special attention to the introduction and the conclusion.

3. Intensive Reading

You need to have your aims clear in mind when undertaking intensive reading. Remember this is going to be far more time consuming than scanning or skimming.

If you need to list the chronology of events in a long passage, you will need to read it intensively.

This type of reading has indeed beneficial to language learners as it helps them understand vocabulary by deducing the meaning of words in context.

It moreover, helps with retention of information for long periods of time and knowledge resulting from intensive reading persists in your long term memory.

This is one reason why reading huge amounts of information just before an exam does not work very well. Students tend to do this, and they undertake neither type of reading process effectively, especially neglecting intensive reading. They may remember the answers in an exam but will likely forget everything soon afterwards.

4. Extensive reading

Extensive reading involves reading for pleasure. Because there is an element of enjoyment in extensive reading it is unlikely that students will undertake extensive reading of a text they do not like.

It also requires a fluid decoding and assimilation of the text and content in front of you. If the text is difficult and you stop every few minutes to figure out what is being said or to look up new words in the dictionary, you are breaking your concentration and diverting your thoughts.

Lecture 5: How to Read a Scientific Article

I. ABSTRACT

The Abstract portion of an article is a short summary of the article as a whole. It should include the focus and results of the study as well as ultimate conclusions drawn. It does not explain in full any of the above, so it is important to use the abstract as a tool to decide if you should investigate further.

The Abstract is always available even when an organization does not have a subscription to a journal.

The Abstract is the best thing to read FIRST.

Question to ask: Does this interest me? Is this related to my area of research?

II. INTRODUCTION

The Introduction of a paper explains the idea investigated. It should include what many refer to as a "Literature Review", which is a summary of research already performed by others about the same topic. Here it should indicate why THIS particular study is unique or how it adds to the discussion.

The literature review may have its own section in the paper, if so; it will directly follow the Introduction.

If the Abstract is unclear, you may wish to read the Introduction second, if the Abstract is clear, the Introduction may wait until you read more of the paper.

Questions to ask:

What have other people done in regards to this topic?
How is this research unique?
Will this tell me anything new?

III. MATERIAL AND METHOD

The Materials and Methods section of a paper tells you how the study was performed. It *should* include the specifics of the experiment or study, so if you wanted to repeat it, you could. It is important to note that not all studies include enough information to be repeated, and that is considered a poor Materials and Methods section.

Some people suggest reading Materials & Methods second, so you can see if all of the information is there to repeat. However, sometimes the M&M section may be too technical for some readers. You may also jump to the Discussion second, or the Introduction, if you still are not sure what the article is trying to convey.

Questions to ask:

Could I repeat their work?

Is all the information present in order to repeat it?

IV. RESULTS

The Results section of a research paper should tell you, in unbiased terms, what the findings were.
The data should be included here.

Rarely the Results and Discussion sections will be combined.

Some suggest reading the Results section before the Discussion to review the data without opinions of the researchers clouding your judgment. Some may wish to read the Discussion first to see if the paper still holds interest for them.

Questions to ask:

Are the results presented in a factual and unbiased way?

Is all the data present?

What conclusions do you formulate from this data?

V. DISCUSSION / CONCLUSION

The Discussions section of a research paper should tell you what the researchers felt was significant about the results. This is where they analyse the data. What did the data tell them? They may also point to facts and figures.

The Conclusion of a scientific paper tells you the final thoughts from the researchers. It may reiterate what they noted in the Discussion or it may even be combined with the Discussion. Many times the Conclusion recommends areas to be researched in the future.

The Conclusion may generally be read last.

Questions to ask:

Does their analysis agree with the data present?

What are the weaknesses in their argument?

Is the conclusion valid?

Based on what you have read, what other research should be explored next?

VI. REFERENCES

The References section of the article gives credit to other scientists and researchers. It shows you what works the article you are reading referred to when planning their research and writing their paper. Any articles they mention in their Introduction or Literature Review should be present here. Any studies they modeled their Materials and Methods on should be included here.

The References may be read at any time during the process. You may want to follow up a point made in the text, or you may want to look them over in the end to see what else you might read.

Questions to ask:

- What other articles should I read?
- What other authors are respected in this field?

Lecture 6: How to Summarize a Scientific Article

Research articles usually use standard formats to communicate in a clear manner any kind of information regarding an experiment. A good research article would usually contain a title, an abstract, an introduction, the methodology, the results, a discussion, and some references.

When you have to write a summary of the research paper, you will need to know how to proceed from start to finish. Every detail is important if you want to come up with a good article summary in a due course.

To write a good summary, the following steps

- ✓ Read the article carefully. Then try to understand its main subject or purpose.
- ✓ Read it again to understand it in more detail.
- ✓ Underline the key words.
- ✓ Underline the relevant parts of the text.
- ✓ Write the points down in note form, using your own words – Make the notes as brief as possible.
- ✓ Organize the information in logical order.
- ✓ Avoid repetition. i.e. don't repeat information, even if it's repeated in the text.
- ✓ Write your summary.
- ✓ If you want to start with an introductory sentence, make it brief.
- ✓ Using linking words/phrases and paraphrase where possible. Include only information which is relevant to the topic.
- ✓ The first sentence or two of your summary should contain the author's thesis, or central concept, stated in your own words.
- ✓ Use key vocabulary from the text when you can.
- ✓ Use your own words. Occasionally, however, a phrase in the original may be especially striking, interesting, or controversial. In this case, you may use the author's exact words.
- ✓ Don't include your own ideas or comments. The summary should include only the author's ideas.

- ✓ Make sure your summary is within the set word limit.
- ✓ Edit your summary, check spelling, punctuation etc.
- ✓ Try to be relevant, coherent, precise and concise.

Lecture 07: Introduction To Biochemistry

I. Definition of Biochemistry

Biochemistry is field of experimental science aimed at studying the chemical basis and the molecular mechanisms of life. The progress of molecular biology, which is one of the disciplines of biochemistry, has been most significant over the last 20 years. The comprehension of the molecular nature of genetic information linked to recombinant DNA engineering techniques enabled biochemists to make important advances in diverse domains such as human genetics, pharmacology, agricultural and environmental science and in the understanding of evolution. In this fashion, biochemistry contributed to the emergence and success of biotechnology, which is an important new sector of modern economy. The techniques associated with the structural analysis of macromolecules (proteins and nucleic acids) enabled modern biochemistry to unravel the most intimate secrets of life.

Biochemistry is the branch of science that explores the chemical processes within and related to living organisms. It is a laboratory based science that brings together biology and chemistry. By using chemical knowledge and techniques, biochemists can understand and solve biological problems.

Biochemistry focuses on processes happening at a molecular level. It focuses on what's happening inside our cells, studying components like proteins, lipids and organelles. It also looks at how cells communicate with each other, for example during growth or fighting illness. Biochemists need to understand how the structure of a molecule relates to its function, allowing them to predict how molecules will interact.

Biochemistry covers a range of scientific disciplines, including genetics, microbiology, forensics, plant science and medicine. Because of its breadth, biochemistry is very important and advances in this field of science over the past 100 years have been staggering. It's a very exciting time to be part of this fascinating area of study.

Biochemists, the silent heroes of Medicine

Without the basic science discoveries on the molecular basis of life made by biochemists only very few of the important discoveries that have led to advancements of modern medicine would have been possible.

Some important discoveries made by biochemists

- Discovery of the DNA structure : James Watson and Francis Crick
- Discovery of insulin : Frederick Banting and Charles Best
- Discovery of acetaminophen (Tylenol) : Julius Axelrod
- Discovery of cyclosporine (drug used to prevent the rejection of transplanted organs) : Jean Borel
- Discoveries that led to the design of 5′ phospho-diesterase inhibitors (Viagra) : Robert F. Furchgott, Louis J. Ignarro and Ferid Murad
- Discovery of prions – a new biological principle of infections (the cause of mad cow disease) : Stanley B. Prusiner
- Important discoveries in the area of genetic engineering were made by the Canadian Dr. Michael Smith. The results of his work enabled the production of therapeutic proteins and he was awarded the Nobel Prize in Chemistry in 1993.

Important challenges remain towards the discovery of cures for many diseases. Overcoming these challenges is part of the task of biochemists who work in biomedical research.

What Types of Molecules Do Biochemists Study?

The principal types of biological molecules or biomolecules are: **carbohydrates, lipids, proteins, nucleic acids**

Many of these molecules are complex molecules called polymers, which are made up of monomer subunits. Biochemical molecules are based on carbon.

What Is Biochemistry Used For?

- Biochemistry is used to learn about the biological processes which take place in cells and organisms.
- Biochemistry may be used to study the properties of biological molecules, for a variety of purposes. For example, a biochemist may study the characteristics of the keratin in hair so that shampoo may be developed that enhances curliness or softness.
- Biochemists find uses for biomolecules. For example, a biochemist may use a certain lipid as a food additive.
- Alternatively, a biochemist might find a substitute for a usual biomolecule. For example, biochemists help to develop artificial sweeteners.
- Biochemists can help cells to produce new products. Gene therapy is within the realm of biochemistry.

The development of biological machinery falls within the realm of biochemistry.

What Does a Biochemist Do?

Many biochemists work in chemistry labs. Some biochemists may focus on modeling, which would lead them to work with computers. Some biochemists work in the field, studying a biochemical system in an organism. Biochemists typically are associated with other scientists and engineers. Some biochemists are associated with universities and they may teach in addition to conducting research. Usually, their research allows them to have a normal work schedule, based in one location, with a good salary and benefits. They also:

- Provide new ideas and experiments to understand how life works
- Support our understanding of health and disease
- Contribute innovative information to the technology revolution
- Work alongside chemists, physicists, healthcare professionals, policy makers, engineers and many more professionals

Biochemists work in many places, including: Hospitals**,** Universities**,** Agriculture**,** Food institutes**,** Education**,** Cosmetics**,** Forensic crime research**,** Drug discovery and development.

Biochemists have many transferable skills, including: Analytical**,** Communication**,** Research**,** Problem solving**,** Numerical**,** Written, Observational**,** and Planning.

What Disciplines Are Related to Biochemistry?

Biochemistry is closely related to other biological sciences that deal with molecules. There is considerable overlap between these disciplines: **Molecular Genetics, Pharmacology, Molecular Biology, and Chemical Biology**

The study of life in its chemical processes

Biochemistry is both life science and a chemical science - it explores the chemistry of living organisms and the molecular basis for the changes occurring in living cells. It uses the methods of chemistry, "Biochemistry has become the foundation for understanding all biological processes. It has provided explanations for the causes of many diseases in humans, animals and plants."

Physics, molecular biology, and immunology to study the structure and behaviour of the complex molecules found in biological material and the ways these molecules interact to form cells, tissues, and whole organisms.

Biochemists are interested, for example, in mechanisms of brain function, cellular multiplication and differentiation, communication within and between cells and organs, and the chemical bases of inheritance and disease. The biochemist seeks to determine how specific molecules such as proteins, nucleic acids, lipids, vitamins, and hormones function in such processes. Particular emphasis is placed on the regulation of chemical reactions in living cells.

An essential science

Biochemistry has become the foundation for understanding all biological processes. It has provided explanations for the causes of many diseases in humans, animals, and plants. It can frequently suggest ways by which such diseases may be treated or cured.

A practical science

Because biochemistry seeks to unravel the complex chemical reactions that occur in a wide variety of life forms, it provides the basis for practical advances in medicine, veterinary medicine, agriculture, and biotechnology. It underlies and includes such exciting new fields as molecular genetics and bioengineering.

The knowledge and methods developed by biochemists are applied to in all fields of medicine, in agriculture and in many chemical and health-related industries. Biochemistry is also unique in providing teaching and research in both protein structure/function and genetic engineering, the two basic components of the rapidly expanding field of biotechnology.

A varied science

As the broadest of the basic sciences, biochemistry includes many subspecialties such as neurochemistry, bioorganic chemistry, clinical biochemistry, physical biochemistry, molecular genetics, biochemical pharmacology, and immunochemistry. Recent advances in these areas have created links among technology, chemical engineering, and biochemistry.