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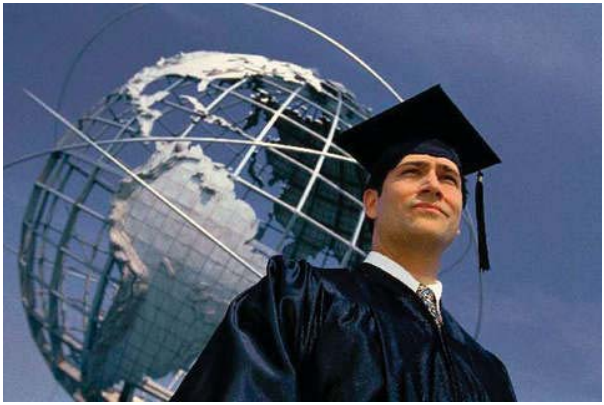
Учебно-методическое пособие



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Кафедра иностранных языков для естественнонаучных специальностей

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Настоящее пособие адресовано магистрантам и аспирантам естественнонаучных направлений. Пособие содержит информацию об организации научно-исследовательской работы магистрантов и аспирантов в англоязычных странах и в России. Оно призвано помочь магистрантам и аспирантам подготовиться к участию в международных конференциях, усовершенствовать навыки чтения и перевода оригинальной научной литературы, подготовить устное или письменно высказывание по теме диссертационной работы, изложить содержание прочитанного в форме резюме и аннотации.

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Содержание

Предисловие

Настоящее пособие адресовано магистрантам и аспирантам естественнонаучных направлений, таких как «Биология», «Ботаника», «Биология клетки», «Иммунобиотехнология», «Нейробиология», «Спортивная физиология», «Химия», «География», «Экология и природопользование».

Основная задача при изучении иностранного языка магистрантами и аспирантами – достижение практического владения языком, которое позволит использовать его в научной работе.

В этой связи целью пособия является развитие коммуникативных умений и навыков различных видов речевой деятельности, а также навыков аннотирования и реферирования научной литературы.

Пособие состоит из четырех разделов. В первом разделе предлагаются несколько оригинальных текстов по теме раздела, а также речевые упражнения, образцы коммуникативных ситуаций диалогической и монологической речи, что отвечает принципам современной коммуникативной методики. Во втором разделе содержится информация о типах научных конференций и об основных принципах построения публичного выступления. Третий раздел посвящен особенностям составления резюме и аннотаций текстов естественнонаучной тематики, которые помогут изложить содержание прочитанного материала в устной или письменной форме. Четвертый раздел включает в себя аутентичные тексты на английском языке для чтения, перевода и реферирования по основным направлениям «Биология», «Химия», «География».

При отборе текстов авторы стремились к тому, чтобы каждый текст носил общенаучный характер и был насыщен лексикой, связанной с научной работой. Активный лексический и грамматический минимум определяется темами пособия.

Пособие может быть использовано при изучении английского языка как на занятиях под руководством преподавателя, так и для самостоятельного изучения и изложения содержания прочитанного материала в устной или письменной форме. Материалы пособия апробированы на практических занятиях с магистрантами биолого-химического и географического факультетов и в группах аспирантов.

1. My scientific research work

1.1. Read the following text paying attention to the similarities and differences in a scientist's status in different countries

Полноценное общение на научной конференции предполагает, что ее участники, с одной стороны, имеют достаточно ясное представление о положении, занимаемом в научном мире их коллегами, а с другой – умеют пояснять средствами английского языка свои научные позиции.

Научный статус ученого в известной степени характеризуется рядом формальных показателей, среди которых степень, звание, место работы, занимаемая должность, обладание специальными наградами, членство в различных обществах и ассоциациях.

Одним из важнейших показателей научной квалификации является степень (degree). В англоязычных странах успешное окончание трех-, четырехлетнего курса обучения в высшем учебном заведении, как правило, приводит к получению степени бакалавра (Bachelor's degree): Bachelor of Science, сокр. B.Sc./B.S. (естественные науки); Bachelor of Arts, сокр. A.B./B.A. (гуманитарные науки); Bachelor of Fine Arts, сокр. B.F.A. (искусство); Bachelor of Business Administration, сокр. B.B.A. (управление) и т.д. Степень бакалавра часто называется в англоязычных странах первой степенью (first degree). Например, ученый, изменивший свою специализацию, может сказать так: «I got my first degree in chemistry and then I switched over to the field of biology».

Принято считать, что степень бакалавра соответствует диплому выпускника российского вуза с четырехлетним циклом обучения (бакалавра), сдавшего государственные экзамены.

Студенты, продолжающие занятия после получения первой степени (graduate/postgraduate students), могут

претендовать на степень магистра (master's degree): Master of Science, сокр. M.S.; Master of Arts, сокр. M.A.; Master of Fine Arts, сокр. M.F.A. и т.д. Для получения этой степени после года или двух лет учебы и участия в исследовательской работе необходимо сдать еще ряд экзаменов и, как правило, представить диссертацию (thesis).

Принято считать, что степень магистра соответствует диплому выпускника российского вуза с пяти-, шестилетним циклом обучения, выполнившего и защитившего дипломный проект.

Отметим, однако, что использование слова diploma по аналогии с русским словом диплом (свидетельство об окончании вуза) может привести к неточному пониманию собеседником вашей мысли. Дело в том, что в англоязычных странах завершение курса обучения получением diploma, как правило, менее почетно, чем получение degree. Это обстоятельство можно учесть путем обращения к слову degree, когда речь идет о высшем образовании. Например, обладатель диплома инженера-химика может сказать: I have a master's degree in chemical engineering.

Следующая степень в англоязычных странах – это степень доктора философии (Doctor of Philosophy, сокр. Ph.D.). Она присуждается представителям различных наук, как естественных, так и гуманитарных. Использование слова Philosophy в данном случае носит чисто традиционный характер и объясняется тем, что изначально оно имело более общее значение «наука вообще». Например, обладателем этой степени может быть ботаник: «I left English to go to Canada to be a student of advanced botany. In Canada I earned the degree of Master of Science and also Doctor of Philosophy».

Часто степень доктора философии называют doctoral degree / doctor's degree/doctorate: "I attended a college in Arizona for my bachelor's degree and my master's degree. Then I got my doctoral degree at the University of Hawaii". Претендент

на эту степень должен провести оригинальное научное исследование, как правило, в рамках специальной учебной программы (Ph. D. program/studies), сдать ряд экзаменов и обязательно представить диссертационную работу (doctoral thesis/dissertation). Как правило, к работе над докторской диссертацией исследователь приступает после получения степени магистра: «I am twenty-six years old and have just completed my master's degree in science. And I'm going to begin my Ph. D. program next September in Canada».

Рассказывая о своем научном пути, ученые нередко называют степени магистра и доктора одним из сочетаний типа advanced/graduate/higher degree: "After graduation from Florida State University I received an advanced degree in economics at Duke University". Ученый может обладать несколькими степенями в разных областях и от разных учебных заведений: «I have graduate degrees from the American University and the University of Miami in Florida».

Принято считать, что степень доктора философии соответствует ученой степени кандидата наук, что позволяет российскому научному работнику этой квалификации представляться доктором при общении на международном уровне. понятие ученая степень кандидата наук может быть выражено, например, словом doctorate: "I got my doctorate in economics two years ago".

При использовании сочетаний типа candidate's degree/candidate of sciences или candidate of chemistry/candidate of chemical science (s) и т.п. следует иметь в виду, что они, являясь дословным переводом с русского, будут понятны только тем зарубежным ученым, кто знаком с научными реалиями нашей страны, что ограничивает круг их употребления или, во всяком случае, требует дополнительных пояснений, например, таких: «I have a candidate's degree which corresponds to the Ph.D. degree in your country».

Не в пользу дословного перевода русского словосочетания кандидат наук как candidate of science (s) без соответствующих разъяснений говорят два обстоятельства. Во-первых, оно может быть интерпретировано носителем английского языка по аналогии со словосочетаниями bachelor of science, master of science и тем самым создаст впечатление, что вы работаете в области естественных наук, а это может не соответствовать действительности. Во-вторых, необходимо учитывать, что слово candidate часто используется в сочетаниях Ph.D. doctoral candidate, где оно указывает, что данный исследователь работает над соответствующей диссертацией, но степени доктора философии еще не получил.

Сочетание doctoral candidate может быть удачным эквивалентом русскому понятию соискатель. Ср.: Сейчас я являюсь соискателем степени кандидата экономических наук. – Now I am a doctoral candidate in economics. Соответственно для обозначения понятия аспирант наряду со словосочетаниями graduate/postgraduate student можно использовать и сочетание doctoral student особенно, если учесть, что оно точнее передает позицию аспиранта как исследователя, работающего над диссертацией, соответствующей докторской диссертации в англоязычных странах. Дело в том, что сочетания graduate student (амер.) и postgraduate student (брит.) употребляются для обозначения студентов, которые могут работать по программам, ведущим к получению степени, как доктора философии, так и магистра.

Наряду со степенью доктора философии в англоязычных странах есть ряд почетных докторских степеней (honorary/higher/senior doctorates), присуждаемых сравнительно немногим ученым за долголетнюю и плодотворную научную деятельность. Среди них степени: Doctor of Science, сокр. D.Sc. (естественные науки); Doctor of

Letters, сокр. Litt.D. (гуманитарные науки); Doctor of Laws, сокр. L.L.D. (юриспруденция) и ряд других. Они не требуют проведения специальных исследований или написания диссертации и присуждаются по совокупности заслуг известным деятелям науки: «Dr. Green received an honorary D.Sc. in engineering from the University of Pennsylvania for his contribution in electromechanical science». Отметим, что ученый может быть обладателем нескольких или даже многих почетных докторских степеней.

По-видимому, сочетание senior doctorate может быть использовано в устной речи для передачи русского понятия степени доктора наук: «I hope to get my senior doctorate within the next three years».

Однако здесь обязательно нужно пояснить, что степень доктора наук в нашей стране требует представления диссертации, а также, как правило, написания монографии. Например, можно сказать: «Our senior doctorate is not an honorary degree. It requires the writing of a dissertation and the publication of a monograph».

Использование сочетаний типа Doctor of Science / Doctor of the Sciences / Doctor of History / Doctor of Technical science (s) и т.д. для передачи степени доктора наук также может потребовать аналогичных разъяснений, если ваш собеседник не ориентируется в российских научных реалиях. В частности, можно подчеркнуть, что степень доктора наук является высшей ученой степенью в нашей стране, а многие из ее обладателей имеют звание профессора: «The Russian Doctor of Science degree is the highest research degree in this country. Many scientists having that degree are professors».

Кроме исследовательских степеней (research degrees) в англоязычных странах имеются также профессиональные докторские степени (professional degrees), которые присваиваются специалистам определенной квалификации в ряде областей, например: Doctor of Medicine, сокр. M.D.

(медицина); Juris Doctor, сокр. J.D. (юриспруденция). Отметим, что обладание профессиональной степенью в англоязычных странах фактически означает, что данный человек имеет квалификацию, отвечающую требованиям, выдвигаемым к специалистам этого плана соответствующей профессиональной ассоциацией. Например, для получения степени Juris Doctor в США необходимо, как правило, сначала получить степень бакалавра, а затем успешно закончить трехлетнюю юридическую школу (law school); для получения степени Doctor of Medicine – степень бакалавра и закончить четырехлетнюю медицинскую школу (medical school) и интернатуру (internship). Таким образом, профессиональные степени в англоязычных странах скорее соответствуют русским дипломам врачей и юристов, хотя и требуют большего времени для их получения, и не могут использоваться в качестве эквивалентов русским ученым степеням кандидатов и докторов медицинских и юридических наук. Обладатели этих степеней должны учитывать это обстоятельство и в случае необходимости дать, например, такое пояснение: «I have a degree which we call Doctor of Medical Science degree. It is our senior research doctoral degree in this field».

Нередко человек является обладателем профессиональной и ученой степени, в частности, M.D. и Ph.D.

Наличие определенной ученой степени позволяет данному научному сотруднику занимать соответствующую должность в исследовательской организации. Например, можно прочитать такое объявление в научном журнале: «We are seeking a postgraduate biochemist (Ph.D.) with experience in protein chemistry to take up an interesting position in our research laboratories».

Названия должностей, которые научные работники могут занимать в государственных и частных исследовательских учреждениях, в том числе и в высших учебных заведениях, в

англоязычных странах весьма разнообразны. В ряде случаев они отражают конкретную специализацию: assistant wild life ecologist, biochemist, plant physiologist, research chemist, senior economist.

Позиции исследователей типа research assistant, senior research assistant, research associate, senior research associate, research fellow, senior research fellow и т.д., в названиях которых не обозначена научная дисциплина, встречаются, как правило, в высших учебных заведениях и относящихся к ним научных организациях. Обычно их занимают исследователи, претендующие на получение докторской степени или обладающие ею, что видно из следующего объявления: «Research associate: Applicants should have submitted their Ph. D. thesis or have a recent Ph. D. degree in biochemistry or chemistry».

Если место предназначено только для исследователя с докторской степенью, то в названиях появляется слово postdoctoral: postdoctoral research fellow, postdoctoral research associate, postdoctoral fellow. Еще один пример объявления: «Postdoctoral Senior or Research Associateship: The appointment is for three years and could start in September, 2005. Applicants must have a Ph. D. degree, or have submitted their thesis for Ph. D. before the starting date».

Добавим также, что позиция associate выше по рангу, чем assistant, и предполагает большую самостоятельность в научной работе.

Следует отметить, что научные сотрудники типа postdoctoral fellow или research fellow занимаются исследовательской работой одновременно с повышением своей научной квалификации. Для этой цели им выделяется специальная стипендия (fellowship).

Следует отличать ученого, занимающего позицию research fellow или postdoctoral fellow, от fellow – действительного

члена научного общества: Brown B.B., Fellow of the Royal Society.

Слово fellow также используется для обозначения членов совета преподавателей колледжа или университета: «Grey G.G., Fellow of Balliol College, Oxford». Такое членство может быть и почетным: «White W.W., Honorary Fellow of University College, Oxford».

Если ученый прекращает активную научную деятельность, но не порывает связей с университетом, его называют Visiting fellow: “I’m actually retired and now am called a visiting fellow which means I have no responsibilities and can enjoy myself”.

В высших учебных заведениях англоязычных стран сосредоточены значительные научные силы. Как правило, ученые совмещают научную и преподавательскую деятельность и нередко делят свое время пополам: «I’m a botanist and a professor of ecology. I have what we call a fifty-fifty appointment. Fifty percent teaching. I teach undergraduate and graduate students, and then the remaining time is taken up with research».

Высшее ученое звание в англоязычных странах – профессор professor/full professor (амер.): professor of oceanology, professor of economics, professor of mathematics.

За большие заслуги перед университетом ученый может получить звание почетного профессора (emeritus professor/professor emeritus): «Dr. Green, Emeritus Professor of Biochemistry, University of London». Как правило, обладатель этого звания не занимается активной научной и преподавательской деятельностью.

Что касается позиции профессора в вузах России, то она обозначается на английском языке словом professor. Доктора наук, имеющие это звание, могут использовать его для уточнения своего научного статуса относительно своих коллег с кандидатской степенью, например, при

представлении зарубежному коллеге: «I'm Professor Petrov and this is my colleague Dr. Ivanov».

На ступеньку ниже профессора в иерархической должностной лестнице в британских вузах стоят reader: "Brown B.B., Reader in Criminal Law, University of Strathclyde"; principal lecturer: "Johnson J.J., Principal Lecturer in Criminal Law. Liverpool polytechnic"; senior lecturer: "Senior Lecturer, University of Birmingham"; в американских университетах – associate professor: "White W.W., Associate Professor of Economics, University of Alaska".

Вышеприведенные сочетания могут быть использованы для приблизительной передачи позиции доцента в вузах нашей страны.

Иногда для обозначения соответствующего звания на английском языке в европейских неанглоязычных странах употребляется слово docent. Обратим внимание, однако, что в некоторых американских университетах этим словом называют преподавателей младшего ранга, не являющихся постоянными членами педагогического коллектива. Поэтому вряд ли можно считать английское слово docent удачным эквивалентом русскому слову доцент. Если же оно все-таки используется в устной речи, то не будет лишним соответствующее пояснение: «Now I occupy the position of docent which corresponds to associate professor or reader in English-speaking countries».

Следующая категория преподавателей в британских вузах известна как lecturer: "Jones J.J., Lecturer in Land Law, University of East Anglia", в американских – assistant professor: "Brown B.B., Assistant Professor of Economics, University of Texas".

В вузах России аналогичную позицию занимает старший преподаватель. Помимо вышеприведенных аналогов для обозначения этой должности можно употребить сочетание senior instructor. Во всяком случае, им иногда пользуются

авторы из англоязычных стран, когда они пишут о системе образования в нашей стране.

Заметим, что дословный перевод на английский язык русского словосочетания старший преподаватель как senior teacher может соответственно потребовать дополнительных пояснений, ибо английское слово teacher в основном используется в отношении школьных учителей.

Для обозначения группы младших преподавателей в англоязычных странах используются такие сочетания, как assistant lecturer (брит.) и instructor (амер.). В нашей стране примерно такую же позицию занимают ассистент и преподаватель. Говоря о своей работе, они могут использовать слово instructor: I am an instructor in English.

Профессор в англоязычных странах, как правило, является одновременно и заведующим кафедрой (head of department): S.S. Smith, D.Sc., Professor and Head of Department, Department of Economics. Таким образом, в круг его обязанностей входит административная преподавательская и научная работа. Говорит заведующий кафедрой экономики одного из американских университетов: «The main part of my responsibilities is administrative, because I have been running the Department of economics. So it takes most of my time. But in addition to that I teach courses. I also supervise the work of graduate students and I try to find some time for my own research».

Несмотря на определенные отличия в организации и функционировании таких подразделений, как кафедра в нашей стране и department в вузах англоязычных стран, эти слова можно использовать в качестве ближайших эквивалентов: кафедра физики – department of physics и наоборот: department of modern languages – кафедра современных языков, но не факультет, как иногда ошибочно переводят сочетания подобного типа.

Слово кафедра нельзя переводить на английский язык как chair, так как данное слово используется лишь для обозначения поста заведующего кафедрой или лица, занимающего эту должность: см., например, два следующих объявления: «The Chair of Economics remains vacant»; «The University of California College of Medicine is seeking a Chair for the Department of Biological Chemistry».

Во главе учебного подразделения типа факультета, называемого в британских университетах faculty (faculty of arts, faculty of science, faculty of law, faculty of economics, etc.), а в американских – college или school (college of fine arts, college of arts and sciences, college of business administration, school of law, school of pharmacy, etc.), стоит dean (декан).

Для передачи позиции декана в высших учебных заведениях можно использовать слово dean, соответственно заместителя декана – sub-dean /associate dean/ assistant dean.

Отметим, что в американских университетах есть ряд должностей, в названия которых входит слово dean: dean of students, dean of university, dean of faculty и т.п., но их функции отличны от функций декана в нашем понимании. Добавим, что в американских вузах слово faculty обозначается основной преподавательский состав, в то время как в британских используется сочетание academic/teaching staff. В беседе с американскими учеными нужно иметь ввиду особенность употребления слова faculty и в случае необходимости ввести соответствующие коррективы: "When I use the word "faculty" I mean by that a devision of the university and not the teaching staff".

Формально университет в странах с британским вариантом английского языка возглавляет chancellor, изредка посещающий его для участия в торжественных церемониях. Фактически университетом руководит ученый, занимающий пост vice-chancellor. Аналогичную функцию в американском университете выполняет president.

Для передачи позиции ректора вуза кроме вышеприведенных аналогов (vice-chancellor, president) можно воспользоваться и словом rector, которое применяется в европейских странах и будет понятно зарубежным ученым. В устной беседе никогда не помешает краткое пояснение: "The rector of our university, in America you would call him president, is a physicist by training".

По-разному в высших учебных заведениях англоязычных стран называются должности, обладатели которых занимают ключевые административные позиции: Vice president for academic affair, vice-president for research, pro-vice-chancellor и т.д. Ученый, занимающий должность, обозначенную словом provost, фактически отвечает за всю учебную и исследовательскую работу, проводимую в институте: "I was dividing my time between research and administration as Provost for MIT (Massachusetts Institute of technology), a position that put me in charge of all the teaching and research done at the Institute - everything in fact, except the Institute's financial matters and its capital equipment."

Соответственно для обозначения на английском языке позиции проректора в вузе можно воспользоваться сочетаниями: prorector, vice rector или deputy vice-chancellor; проректор по учебной работе - prorector for academic affairs; проректор по научной работе prorector for research.

Что касается научно-исследовательских институтов и других организаций подобного типа, то в названиях должностей, которые занимают их сотрудники, часто встречается слово scientist без указанной научной дисциплины: assistant scientist, research scientist, senior research scientist, principal scientist, senior scientist и т. п. Представляется гидролог, специалист в области поведения рек: "I am a research scientist and my specialty is hydrology, behavior of rivers particularly."

В названиях научных должностей в государственных учреждениях, как правило, присутствует слово officer: scientific officer, senior scientific officer, principle scientific officer, research officer, senior research officer, experimental officer, senior experimental officer.

Для передачи на английском языке ученых званий младший и старший научный сотрудник, имеющихся в научно-исследовательских организациях, могут быть предложены различные варианты. Прежде всего заметим, что вряд ли целесообразно использовать в этом случае слово junior (младший), учитывая, что оно практически не встречается в данном контексте в англоязычных странах. Принимая это во внимание, можно предложить следующие пары для обозначения понятий младший научный сотрудник - старший научный сотрудник (без указания специальности): scientific associate-senior scientific associate, research associate - senior research associate, research scientist - senior research scientist или с указанием специализации: research physicist - senior research physicist, research chemist - senior research chemist. Представителям гуманитарных наук, видимо, следует остановиться на первом из предложенных вариантов, так как такие слова, как scientist и research, как правило, предполагают естественнонаучную тематику исследования.

О научном статусе участника конференции можно судить и по занимаемой им административной должности: director of institute; deputy/associate/assistant director; head of department/division; head/chief of laboratory; head of group; project director/leader; head of section и т.д.

Подбирая английские эквиваленты названиям руководящих научных должностей типа заведующий отделом лабораторией руководитель группы и т.п., можно рекомендовать нейтральное и ясное во всех контекстах слово head: head of department, head of laboratory, head of group.

Отметим, что использование слова laboratory предполагает, что речь идет о естественнонаучной тематике исследований. Поэтому сочетание лаборатория гуманитарных дисциплин можно передать по-английски the humanities group. Добавим, что за названием laboratory/laboratories может скрываться и крупная научная организация (Bell Telephone Laboratories), и ее руководитель (director) соответственно имеет статус директора научно-исследовательского института.

Важным показателем научных достижений ученого является вручение ему различных наград (medals, prizes, awards). Особое признание его заслуг в международном масштабе отмечается присуждением Нобелевской премии (The Nobel Prize).

Свидетельством заслуг ученого является его избрание в члены ряда научных обществ, например, таких, как Королевское общество (The Royal Society) в Великобритании, Американская Академия наук и искусств (The American Academy of Arts and Sciences), Национальная академия наук (The National Academy of Science) в США и т.п.

Соответственно в России высшие научные позиции занимают члены Академии наук (members of the Russian Academy of Science): члены-корреспонденты (corresponding members) и действительные члены (full members / academicians).

В заключение отметим, что научный статус участника конференции в известной мере определяет выбор той или иной формы обращения к нему в процессе общения.

1.2. Read the text to find the answers to the following questions:

a) What does your research deal with?
b) What are you engaged in at present?

Inform your colleague:

a) what entrance examinations you have already passed;
b) what the theme of your dissertation is;
c) how many scientific papers you have published;
d) if you are busy with making an experiment.

1.2.1. Study the text below.

My research work

I'm a biologist in one of the Izhevsk research laboratories. My special subject is biology. I combine practical work with scientific research, so I'm an undergraduate working on getting my Master's degree.

I'm doing research in biology particularly in immunology which is now widely accepted. This branch of knowledge has been rapidly developing in the last two decades. The obtained results have already found wide application in various spheres of life.

I'm interested in immunology because it's up-to-date issue. I have been working at the problem for two years. I got interested in it when I was a student.

The theme of the future Master's dissertation is "Possible mechanisms of immunotherapy for maintaining pregnancy in recurrent spontaneous aborters: analysis of anti-idiotypic antibodies directed against autologous T-cell receptors". I think this problem is very important nowadays.

My work is both of theoretical and practical importance. It is based on the theory developed by my research adviser, professor S. Petrov. He is head of the department at the Udmurt State University. I always consult him when I encounter difficulties in my research. We often discuss the collected data.

I have not completed the experimental part of my thesis yet, but I'm through with the theoretical part. For the moment I have 4 scientific papers published. One of them was published in the US journal.

I take part in various scientific conferences where I make reports on my subject and participate in scientific discussions and debates.

I'm planning to finish writing the dissertation by the end of the next year and prove it in the Udmurt State University. I hope to get a Master of Science Degree (M.S.) in Biology.

1.2.2. Answer to the following questions:

1. What are you?
2. What is your special subject?
3. What field of knowledge are you doing research in?
4. Have you been working at the problem long?
5. Is your work of practical or theoretical importance?
6. Who do you collaborate with?
7. When do you consult your scientific adviser?
8. Have you completed the experimental part of your dissertation?
9. How many scientific papers have you published?
10. Do you take part in the work of scientific conferences?
11. Where and when are you going to get M.S. degree?

1.2.3. Make a list of the most important points for you in the text

1.2.4. Speak about your research work using the chosen points

1.3. Read the texts and discuss the problems of research work organisation.

Some Aspects of Research Work Organization in English - Speaking Countries

Science is not licensed profession, and to be counted as a scientist one need not be a Doctor of Philosophy… But a scientist without a Ph.D. (or a medical degree) is like a lay brother in a Cistercian monastery. Generally he has to labor in the fields while others sing in the choir. If he goes into academic life, he can hope to become a professor only at the kind of college or university where faculty members are given neither time nor facilities for research… A young scientist with a bachelor's or a master's degree will probably have to spend his time working on problems, or pieces of problems, that are assigned to him by other people and that are of more practical than scientific interest. Wherever he works, the prospects are slight that he will be given much autonomy and freedom. Having a Ph. D. or its equivalent - a medical degree plus post-graduate training in research - has become in fact, if not in law, a requirement for full citizen ship in the American scientific community.

Leading Research Centres

To be successful as a scientist, it is important not only to have a Ph. D., but to have earned it at the right place. From the standpoint of rightness, American universities may be divided into three groups. The first is made up of those institutions to which the term "leading" may appropriately be applied. They include Chicago, Cal Tech, the University of California at Berkeley, Columbia, Harvard, Illinois, M.I.T. (=Massachusetts Institute of Technology), Michigan, Princeton, Stanford, Wisconsin, Yale, and perhaps two or three others. These are the universities whose professors get the biggest research grants, publish most scientific papers, serve on the most important government committees, win most of the scientific prizes, and are most likely to be acknowledged as leaders in their fields … Ranking just below these twelve are universities like Minnesota and Indiana and

U.C.L.A. (University of California at Los Angelos), where scientists and scholars of international renown are also to be found, but in such dense clusters as at Harvard or Berkeley … This is not to say that first-rate scientists are to be found only at first-rate universities - or that are no second-rate people at Berkeley and M.I.T. But the brightest students, like the brightest professors, tend to be found at the leading universities.

Postdoctoral Study

Although possession of a Ph. D. is supposed to signify that a scientist has learned his trade as a researcher, it is now very common for young scientists to continue in a quasi-student status for a year or two after they get their doctorates … Older scientists as a rule are very happy to take on postdoctoral students. The postdoc, as he is sometimes called, is like an advanced graduate student in that he does research under the general direction of an older man. But he usually needs much less direction of an older man and he can therefore be much more helpful to an experienced scientist who is eager to see his work pushed forward as rapidly as possible… Postdoctoral trainees can have the further advantage of serving a professor as a middleman in his dealing with his graduate students.

For young scientists themselves, a year or two of postdoctoral study and research has many attractions. For some it is a chance to make up for what they didn't learn in graduate school. For scientists whose graduate training has been good, the chief advantage of doing postdoctoral research is that it gives them a couple of years in which they can put all their effort into research. A postdoctoral fellowship can also be a relatively tranquil interlude between the pressures and intellectual restrictions of life as a graduate student, and the competition and distractions of life as an assistant professor. Many scientists go abroad, not because the training they get will necessarily be better than they would get

in the United States, but because a postdoctoral fellowship gives them a chance to travel – often for the first time in their lives.

1.4. Read the following dialogue in parts

Q: What do you do after you receive your bachelor's degree?

A: With a bachelor's degree you can apply to a graduate school and start working towards a master's degree. If you have a bachelor's degree you can also go to a professional school.

Q: What is professional school?

A: Law and medical schools are considered professional schools. If you go to a medical school it's a four years program, basic program, and then you usually have internship. You usually have to be on intern for a year. But it depends on your speciality. If you're going into surgery you may have another year. Well, anyway it can be a far longer program than four years. In the end you get a M.D., Doctor of Medicine degree. Medical schools are run by the American Medical Association, A.M.A. and law schools by the American Bar Association, A.B.A. It's a three year program and you get a J.D., Juris Doctor degree.

Q: And if you go to a graduate school, how many years does it take to get a master's and a doctorate?

A: I think it depends on the program and every program is different. Usually a master's is a couple of years and a doctorate is another two or three years. Usually Ph. D. and master's programs are in the same place and you simply continue. The master's degree is not very important, it's a step on the way to get a Ph. D. You simply stay on the same program and continue. But you can change. You can get a master's degree in one place and then change schools and get a Ph. D. degree in another one.

Q: What do you know about honorary degrees?

A: I don't know much about that. But I do know that my college gives honorary degrees. For example at the graduation ceremony when I got my bachelor's degree they awarded some

very accomplished elderly man a Doctor of Letters degree. It's an honorary degree and it means the institution recognizes that person.

Q: What is the most important division at an American university?

A: It's a department. But you don't belong to a department. You're a student and you have a major. Your major is in one department and usually your advisor is also in that department. So the department requires certain courses. In order to major you have to do these certain courses. Perhaps a quarter or a half of your courses are in the direction of your major department.

Q: Could you name the positions which are occupied by the university teachers?

A: O.K. I'll start with the bottom. A private institution can hire anyone. The lowest rank is instructor. Actually he teaches anything they need. For instance, you can have a native speaker who teaches some conversation courses. You hire that person and he may have no advanced degree whatsoever. I think the assistant professor is the next highest. Usually when you hire an assistant professor that's someone who is likely to be on a tenure track. That's a lower rank and it's assumed you eventually would achieve a higher rank. They do anything, they do whatever the department decides. An assistant professor usually has a master's degree. Now when there are so few university jobs they are usually people who have almost a Ph.D. or already have a Ph.D., people who are writing their dissertations or are close to a Ph.D. and it's assumed they will finish their Ph.D. They couldn't move you up until you get your Ph.D. You really have to have it before you get an associate professor or full professor.

Q: What is a tenure position?

A: Each department has some tenure positions which are lifetime positions. It's an academic protection. You can't fire that person. An associate professor who after a number of years has done his Ph.D. is considered for tenure. Say, there are four tenure

positions and someone is retired and if you're considered qualified enough you get tenure. It's a very long and difficult process because the college or university is committing itself to you, to that person. And if you don't get tenure, and you're turned down, you usually quit and go to another university.

Q: It is important not only what position you have but also where you work?

A: That's right. Each organization, basically, runs its own show. A major university, Berkeley, for example, has its own research organizations connected with the university. If you're associated with the university you may have an academic title or simply be a part of the research organization at Berkeley, I think in a lot of areas you're considered important and accomplished if you're a senior associate at
Berkeley research institute. Because Berkeley is very important. Because Berkeley is a big name. Every field has its big names.

1.4.1. Discuss the problems in the dialogue

1.4.2. Make a list of the most important points for a person to be qualified as a scientist in an English-speaking country

1.4.3. Make up your own dialogue based on the situation in Russia.

1.4.4. Use the following situations to start a short talk:

1. Your scientific adviser has looked through your paper meant for the conference. He is making some critical remarks now.
2. You are upset about your research findings. You can't get any positive result. Your friend tries to cheer you up.

Use the following key phrases in your dialogue

To discuss one's idea; How very interesting; Let us see what we can do about it; there are gaps in (пробелы) your knowledge; I'll fill up my gap of knowledge in the library; I want to know everything possible in the field of my research; it is necessary to consider the facts.

Think of situations where the following proverbs can be used:

1) Well begun is half done - Лиха беда - начало;
2) A big ship sales in deep waters - Большому кораблю – большое плавание.

1.5. Read the excerpt from an interview by Boris Saltykov with MN's correspondent on the problems of Russian fundamental science. Give the full analysis of the text:

Russian Scientific Potential To Be Fully Tapped Yet

As he arrived in Stockholm to receive a Nobel Prize, Academician Alexei Abrikosov, who has long been living in the United States, said: This is probably the last prestigious prize to be awarded to Russian scientists because domestic science today gets hardly any funding at all while the best brains have already fled abroad. The other Russian Nobel Prize winner, Academician Vitaly Ginzburg, is of a different opinion: The country still has enough intellectual potential for scientific breakthroughs.

How long will it be before this potential runs out? And, is it only the financial crunch that is ruining Russian science? Boris Saltykov, president of the Russian House of International Science-and-Technology Cooperation association and, in 1991-96, RF science and technology policy minister, talks about these and other problems in an interview with MN's Tatyana Skorobogatko.

So, what is the outlook for Russians winning more Nobel Prizes in the foreseeable future?

I don't know about prizes, but I believe that Russia's scientific potential is far from being exhausted. There are some scientific schools that are still up to the finest international research standards. Say, excellent results are being achieved in the field of thermonuclear energy and elementary particles physics. True, the number of such schools is shrinking: Their founders pass away while their talented students go to work in the West. Students of science theory know very well that the golden age of Soviet science was in the 1960s and early 1970s, when the country was awash with petrodollars. That was the time when new laboratories, research centers, and entire branches of science were emerging with young people coming to work there. A 25-year-old lab chief or a 30-year-old deputy director or even director was a perfectly normal thing then. Almost all ideas that are winning prizes today originated in those years.

The command economy is no more and the money is even scarcer, but the old principle of financing is still in place?

Not only the principle of financing. The entire paternalistic command-and-administer structure of science is still alive. Say, the Academy still acts as a kind of fundamental science ministry. It manages vast state property and distributes enormous state resources between institutions under its jurisdiction.

But what the science infrastructure needs is not so much support as development. In other words, the lion's share of resources should be given to the best. It is an open secret that the majority of the once densely populated research institute building today are half filled at best, while researchers go to work abroad. Russian scientists are in 40th position or thereabouts in the frequency of quotation in the
world's leading science journals. Should we still take pride in our fundamental science?

Clearly, Russian fundamental science is hard put to develop within the bounds of the old structure, which does not fit into a

new economic system. So why is the Academy not reforming itself?

The idea was aired in early 1990s. But academicians managed to persuade the political leadership at the time that reforming the Academy would be tantamount to destroying science, putting forward an interesting thesis: In Russia, two things are not subject to reform, the Church and the Academy of Sciences.

Domestic fundamental science has indeed developed mainly within the academic structure.

Mainly, yes (although the most successful research programs in nuclear physics, for example, have been conducted at institutes affiliated with the Ministry of Atomic Energy). But times have changed. Today, sad as this may be, our science has been "conquered" by the West without a single shot being fired: Tens of thousands of Russian scientists are successfully working abroad. One of them quipped: "They talked about the need for global expansion of Russian science, didn't they? So it has now come about". Should the brain drain be lamented in the first place? If fundamental science is beyond the state's means, perhaps it could develop elsewhere.

It should be lamented, although fundamental science, unlike applied science, indeed has no commercial value. The results are published openly, immediately becoming the property of the whole mankind, even when a theoretical discovery could in the future produce tangible practical benefits. Take, for example, the human genome deciphering project: It has given a powerful impetus to a fairly "commercial" sector – medicine.

Has Russia really lost an opportunity to tap its results because it did not invest in this international project?

It has not, in theory. Yet I recently talked to a biologist, a Moscow State University professor, who complained that Russia had not taken part in the project, and many specialists had gone abroad. So now we do not have a single genome textbook in Russian – how are we supposed to teach students?

As a result, our undergraduate training establishments, including medical institutes, may fail to ensure effective training of specialists capable of developing genetic technology on a mass scale.

Incidentally, it is not only in scientific research organization but also in formulating scientific research priorities that Russia is going its own unique way. It does not consult the taxpayer about the choice of priorities. Herein lies in fact a distinguishing feature of the paternalistic command system: The state knows better what the country and its citizens need. Elsewhere in the world, priority in the past few
decades has been given to life science, designed to preserve human health and extend the human life span. For some reason, Russia continues to invest the bulk of resources in physics and earth sciences. When the Soviet Union was surrounded by enemies, the public agreed that building an atomic bomb was of paramount importance. What kind of science is society ready to pay for today? Say, U.S. Congress allocated the National Health Institute (a network of scientific organizations conducting research projects in biology, medicine, etc.) even more money than it had asked for.

True, it should be understood that gaining knowledge is far from the only function of fundamental science. Other functions – innovative, expert, social, and cultural – are just as important for society. The education function is one of the most important of these. It is being successfully performed in the United State where fundamental science is concentrated mainly at universities. There is a basic difference between American universities and ours: In America, they are not so much training establishments as powerful scientific and educational centers. Economically, they are an optimal structure – what with the dual use of the equipment and research personnel (both for research projects and for training new scientists by using the latest scientific achievements). I think

that reform of our fundamental science should move in this direction.

Of course plenty of problems arise here. Say, research universities should not answer to the Ministry of Education (in the West, their activity is directed by boards of guardians). Such centers should be headed up not simply by scientists but scientists/managers: There are very few such people among our scientific leading lights. There are many other problems. Yet if there is a policy decision to conduct this "velvet revolution", organizational problems could eventually be resolved.

So we should stop saying that fundamental science is a matter of national prestige?

It is indeed a matter of national prestige – a kind of a state emblem. Surely we cannot reduce everything to practical gain. Say, what benefit does the country derive from its great composers? None at first glance. But this is a matter of national pride. We should likewise we proud of our great scientists. It is important that they continue to appear here in Russia.

Moscow News №1, 2008

1.5.1. Find the information and make a report about Nobel Prizes for Russian scientists in biology, chemistry, physiology and medicine and other sciences.

1.6. Read the text and find the answers to the questions that follow it:

How British Science Is Organized

John B.S.Haldane

The British Association for the Advancement of Science was founded in 1831, and at that time almost every serious scientist in Britain belonged to it. There were so few of them that most of the year's work in a given branch of science could be discussed in a

few days. In fact it merited title of "Parliament of Science" which is still bestowed on it by some newspapers.

Since then the situation has completely changed. At present there are a number of societies, for example the Royal Astronomical Society, the Chemical Society, the Genetical Society, the Geological Society and the Physiological Society which are composed of scientists only. Finally there is the Royal Society of London for Improving Natural Knowledge. This has 384 scientific fellows, 49 foreign members, and 15 British fellows. When it was founded nearly 300 years ago, it included every scientist in England, and many others, such as Samuel Pepys, who were interested in science. But now it only includes a small fraction of scientists, and its discussions are less lively than those of the societies concerned with individual sciences. On the other hand, the British Association is concerned with matters other than science. It has sections devoted to psychology, which is still only partially scientific, and to education and economics, which in this country at any rate are hardly so at all. So it has fallen away from its former scientific spirit to a certain extent.

But except for the Royal Society, the scientific societies have not the money to subsidize research. This is done by universities, the government, industrial firms, and endowed bodies. There is no organization of research on a national scale. Some of the government and industrial research is secret, and therefore of no value to science. For science means knowledge.

The British Association is able to spare a few hundred pounds yearly for grants in aid of research. But its main function now is discussion. New results are generally announced at meetings of smaller societies, and the public hears very little of them. Both in Russia and in Scandinavia the press has far better scientific news than in Britain.

If science is to advance in this country as it should, we need more democracy in the laboratories, also more democratic control of expenditure on research. This will only be possible if the

people are educated in science, and they are at present deliberately kept in the dark. For a knowledge of science leads to a realization of the huge amount of knowledge which could be applied to the public benefit if industry, agriculture and transport were organized for use and not for profit.

1.6.1. Answer the questions:

1. Who belonged to the British Association for the Advancement of Science in the 19th century?
2. Were there many scientists there at that time?
3. It merited title of “Parliament of Science”, didn’t it?
4. Has the situation changed since then?
5. Whom does the Royal Society of London for Improving Natural knowledge include?
6. What issues is the British Association concerned with?
7. It has fallen away from its former scientific spirit, hasn’t it?
8. Do the scientific societies have the money to subsidize research?
9. There is no organization of research on a national scale, is there?
10. Does the public hear much of the research results?
11 What is necessary for the science to advance in Britain?

1.6.2. Give some facts from the text to prove the following:

The British Association is concerned with matters other than science.

1.6.3. Define the main idea of the text

1.6.4. Do you agree that “Science means knowledge”? Speak on the issue

1.7. Read the text for the information on a scientific institution in England. Use the information when doing the assignments that follow

Imperial College, London

The Imperial College of Science and Technology is one of the oldest and most important scientific institutes in England. It now forms part of the University of London, and fulfils the dual purpose of teaching students and fostering research in science and technology.

Imperial College began as the Royal College of Science in the middle of the nineteenth century, when it was realized that teaching and pursuing science and its applications was necessary to fully carry out the industrial revolution and keep Britain in the forepost of technological advance. Many famous scientists were associated with the early days of the College, for example Huxley and Wells. Prince Albert, the royal patron, also closely followed scientific work at the College. With the addition of the City and Guilds Institute and the Royal School of Mines, Imperial College acquired large engineering facilities in addition to those for pure scientific research.

Today the main departments are: Physics (of which Professor Blockett is well known), Civil Engineering, Mechanical Engineering, Electrical Engineering, Aeronautics, Mining Technology, Chemistry and Mathematics. A large new department is the Biochemical Department, headed by Professor Chain.

Imperial College is fortunate in having several new building with many excellent laboratories, and more are being built. A Computer Section develops the facilities of computers for the use at all departments. The College also has facilities outside London in a biological field station and a mining research station.

At the present time about 2000 students are studying at Imperial College for their first degree. There are also about 1000 research students, working for higher degrees and participating in

the research work of the College. A large proportion of them are overseas students from many different countries. There is much excellent research work undertaken at Imperial College in a wide range of subjects. Now research groups include one working on traffic problems, an operational research group, and a history of science department.

Imperial College is still growing in size and numbers, and as an almost independent institution it rivals many other colleges of London University put together. It is possible that it will be associated with other institutes nearly, the Royal Schools of art and Music, to develop into a separate University. In this way it is hoped to continue to train specialized scientists and engineers in a more varied cultural atmosphere than a university is supposed to embody.

research student - аспирант, соискатель;
overseas students - иностранные студенты.

1.7.1. Give Russian equivalents to the sentences:

1.The Imperial College of Science and Technology forms part of the University of London.

2. It fulfils the dual purposes of teaching students and fostering research in science and technology.

3. It was necessary to fully carry out the industrial revolution and keep Britain in the forepost of technological advance.

4. Imperial College acquired large engineering facilities in addition to those for pure scientific research.

5. A Computer Section develops the facilities of the College's computers for the use of all departments.

6. There are about 1000 research students, working for higher degrees and participating in the research work of the college.

7. Much excellent research work is undertaken at Imperial College in a wide range of subjects.

8. Imperial College is still growing in size and numbers.

9. Imperial College rivals many other colleges of London University put together.

10. In this way it is hoped to continue to train specialized scientists and engineers.

1.7.2. Insert prepositions

1. Imperial College is fostering research … science and technology. 2. It was founded as the Royal College … the middle … the nineteenth century. 3. The aim … its foundation was to keep Britain … forepost … technological advance. 4. Many famous scientists were associated … the College. 5. There are large engineering facilities … addition … those … pure scientific research. 6. One … the departments is headed … Professor Chain. 7. The College is fortunate … having several new buildings … many laboratories. 8. The College has facilities … London … a biological field station. 9. … the present time many research students are working … higher degree … Imperial College. 10. Much research work is undertaken … Imperial College … a wide range … subjects. 11. The College is growing … size and numbers. 12. Very soon it will develop … a separate University.

1.7.3. Answer the following questions

1. What kind of institution is the Imperial College of Science and Technology? 2. What are the purposes of the College? 3. In what field does it foster research? 4. When did the College begin as the Royal College of Science? 5. Why was teaching and pursuing science so necessary at that time? 6. What helped to keep Britain in the forepost of technological advance? 7. Who was associated with the early days of the College? 8. What facilities did the College acquire? 9. What are the main departments of Imperial College? 10. Are there any new buildings being built for

the College? 11. Is the College related to the University of London? 12. What was realized in the middle of the nineteenth century? 13. What historical events of great importance took place in the middle of the nineteenth century? 14. What department is run by Professor Chain?

1.8. Answer the questions about your University.

1. What can you tell us about your University? 2. What is your opinion of the research carried on at your University? 3. What do you think is the main purpose of this research? 4. What are the facilities for research at your University? 5. Has it any facilities outside the town? 6. How many research students are there at your department? 7. Is your University growing in size and numbers? 8. Are there any new research units (teams) at your University and what are they working on? 9. What well-known scientists work at your University?

1.8.1. Ask your fellow-student about himself

1. Who are you? 2. Where did you study? 3. When did you graduate from the University? 4. How long have you been studying at the University? 5. Where do you work? 6. How long have you been working there? 7. What is your field (occupation)? 8. What department do you belong to? 9. In what field do you carry on your research?

1.8.2. Give a detailed account of your University, research and activity. The questions below may guide you in your talk. Work in pairs

1.8.3. Talking to your fellow student find out the details about his/her University (department). The following questions may help you

1. Where is your University situated? 2. Is it far from the place you live in? 3. How long does it take you to get there? 4. Does your University occupy one building or several? 5. When was the University founded? 6. Who was the founder of it? 7. After whom is the University named? 8. Who is the head (president) of the University? 9. Is the staff of your University large? 10. Is there a Scientific Council at your University? 11. Who is the Scientific Council? 12. Does the University hold any conferences, symposia or seminars? 13. Are there any distinguished scientists at your University? 14. What kind of research does the University do? 15. Is the scope of research wide? 16. How many departments are there at your University? 17. Who is the head of your department? 18. What kind of equipment do you have at your department? 19. Is it up-to-date?

1.9. Speak about your work. Use the questions below as a guide to your talk

A

1. Are you a Master Student (a post graduate or a research student)? 2. When did you take your post graduate course? 3. Have you passed all your examinations yet? 4. When are you going to take your exam in English? 5. Who is your adviser (superviser)? 6. Do you work at your thesis? Have you started working at your thesis? 7. What part of your dissertation have you completed? 8. Have you got any publications on the subject you study? 9. When are you supposed to read (prove) your thesis? 10. What science degree do you expect to get?

B

11. In what field do you do (carry on) your research? 12. Are you a theoretician or an experimentalist? 13. What problems do you investigate? 14. Do you carry on research individually or in a team? 15. What is the object of your research? 16. What methods do you use (employ) in your work? 17. Is it difficult to analyze the

results (data) obtained? 18. Can you claim that the problem you studied is solved?

1.9.1 Make up a dialogue with your fellow-students about your University (department, research)

Use: be the oldest (youngest); one of the old; one of the new; the aim of the University (department) is; be headed; run by; have good facilities for research; be well equipped with …; undertake research work in …; work for a Master's Degree (Ph.D. degree) …; read for …

2. Conferences and symposia

2.1. Read the text to find out the information about a scientific conference and its participants

Ежегодно в мире организуются сотни разнообразных международных научных встреч (scientific meetings). Большинство из них проходит в форме конференций (conferences), симпозиумов (symposia, ед.ч. symposium) коллоквиумов (colloquia, ед.ч. colloquium) и семинаров (seminars/workshops). Регулярно собираются сессии (sessions) и генеральные ассамблеи (general assemblies, ед.ч. assembly) научных обществ и союзов. Проводят свои совещания (meetings) члены различных международных комитетов и комиссий. Периодически международные ассоциации организуют представительные конгрессы (congresses). Популярны среди ученых деловые по характеру и образовательные по своей сути школы-семинары (schools/short courses/study days /institutes/teach-ins).

Познакомимся с основными реалиями научной конференции, включающие типичные компоненты, присущие данной форме научной коммуникации.

Подготовка научной конференции начинается, как правило, с определения ее темы (theme of the conference/conference theme): 15th Pacific Science Congress. Theme: Conservation, development and utilization of the resources of the Pacific.

Обычно формулируется основная (central/major theme), или официальная, тема (official theme) конференции, которая может допускать широкий выбор вопросов для обсуждения (topics for discussion): “To provide a focus for the meeting, without in any way restricting the topics for discussion, the ISA (International Sociological Association) Executive Committee chose an official theme: Sociological Theory and Social Practice”.

Иногда задается общая тема конференции (general theme), которая разбивается на несколько подтем (subthemes): “The general theme of the Congress: “Mankind’s Future in the Pacific”. This will be developed through seven related subthemes: “Energy and Mankind”, “Nutrition and the Future of Mankind”, “Options for Man’s Future: A Biological View”, etc.

Устроителями научной конференции, обеспечивающим, в частности, ее финансовую поддержку (sponsors of the conference/conference sponsors), являются, как правило, несколько организаций (sponsoring organizations): “The Conference is sponsored by the International Union of Pure and Applied Physics, the American Physical Society and the University of Oregon”.

Многочисленные вопросы подготовки и проведения конференции, а также обслуживания ее участников находятся в ведении организационного комитета (organizing committee). Нередко для разработки научной программы конференции, приглашения и отбора ее участников формируется программный комитет (program committee). Встречаются и другие разновидности комитетов:
местный организационный (local organizing/local arrangements committee), национальный организационный (national organizing committee), дамский (ladies’ committee), ответственный за программу для жен участников и членов их семей, и т.д.

Каждый из комитетов возглавляется председателем (chairman of the committee/committee chairman). Один из организаторов конференции исполняет обязанности ее руководителя в целом (general chairman). Вся документация конференции находится в ведении ее секретаря (organizing secretary / secretary of the conference / conference secretary). Ключевые позиции на конгрессе занимают президент (president of the congress / congress president) и генеральный секретарь (secretary-general).

Когда принципиальные вопросы, связанные с организацией конференции, решены, и возможность ее проведения не вызывает сомнений, в соответствующих научных изданиях появляется информация о конференции в виде приглашения на присылку материалов докладов (call for papers). В этих публикациях указываются, в частности, сроки представления названия (title) и кратких тезисов (short abstracts) предполагаемого сообщения: “Titles and short abstracts should be submitted no later than January 31, 2005”. В них также даются сведения о размерах тезисов и правилах их оформления:

«A 300-word abstract, typed double-spaced (for a 15-minute presentation) should be submitted by April 30, 2005». Далее могут следовать заверения в том, что все тезисы будут рассмотрены и каждый автор будет своевременно информирован о решении организаторов конференции: «All abstracts will be acknowledged. You will be informed by August 31, 2005 whether your abstract has been accepted».

В ряде случаев необходимо представлять подробные тезисы (extended abstract) или два вида материалов: тезисы и автореферат выступления (summary of the presentation): “Each author will be expected to submit the following material: a 50-word abstract of the paper, a summary of the presentation (up to four pages)”.

Принятые тезисы, как правило, оформляются в виде сборника (volume of abstracts / abstracts volume), который распространяется перед началом конференции. В настоящее время все чаще практикуется ознакомление участников с полными текстами докладов, отобранных для представления на конференции. В связи с этим предварительно публикуются материалы докладов в научных изданиях и даже выпускаются отдельные сборники докладов. В этом случае в информационном сообщении указывается срок представления рукописи доклада (manuscript of the paper): “In

case your abstract is accepted you will be required to submit a final manuscript of your paper by December 31, 2005".

О научной конференции можно также узнать из информационных писем или циркуляров (announcements/circulars), рассылаемых заинтересованным научным учреждениям и отдельным ученым. Как правило, первое такое письмо (first announcement/circular) является одновременно и приглашением для участия в конференции: «The International Federation for Information Processing (IFIP) cordially invites you to the World Conference on Computers in Education to be held in Switzerland in July 2005».

Обычно в этом циркуляре имеется специальная заявочная форма (application/registration form), которая после заполнения отправляется по указанному адресу:

«Please complete this form and send it to the Congress Secretary for further information.

Name:

……..

Professional Title:

……..

Address:

……..

…….Country……

I hope to register for the World Conference on Computers in Education.

I intend to submit an abstract on the following topic

……..

I will be accompanied by my spouse».

Ученые, откликнувшиеся на приглашение, попадают в список рассылки (mailing list) и соответственно обеспечиваются всеми информационными материалами по мере их публикации. Не включенные в список должны обращаться непосредственно в организационный комитет

конференции. Об этом они могут узнать из объявления в научном журнале: «Further information will be sent only to those who have accepted the invitation. Those who are not included on the mailing list should contact the Organizing Committee».

Основанием для участия в конференции может быть и личное приглашение, например, организатора (convener/organizer) секции конгресса: “I extend to you a cordial personal invitation to participate in the sessions of this Section and to join the Congress Symposia and other Section meetings”.

В ряде случаев решающим подтверждением участия в конференции помимо выражения принципиального согласия и отправки соответствующих документов и научных материалов является внесение регистрационного взноса (registration fee). Иногда важно внести этот взнос как можно раньше, ибо число участников конференции ограничено и их регистрация проводится в хронологическом порядке (first-come basis registration): “Participation will be restricted to about 75 registrants in order to encourage audience interaction. Registration will be open on a first-come basis and is scheduled to be closed on or before I May 2005 depending on the response”.

Внесение регистрационного взноса дает участникам право воспользоваться рядом дополнительных услуг, например, получить экземпляр тезисов или докладов, стать обладателем билета на прием или выставку и т.д. На что именно расходуется данный взнос, можно узнать из информационного сообщения: «Registration fee includes: participation in the Conference, a copy of the Proceedings and entrance to the Exhibition».

Обычно в информационном сообщении указываются рабочие языки (working languages) конференции: «Papers may be delivered in English, French or German, preferably English».

В бюро регистрации (registration desk) участники конференции получают специальный комплект печатных материалов (registration kit/package/file), в который обычно входит сборник тезисов, программа конференции (conference program), путеводитель (guide/guidebook) или карта-схема городских улиц (street-map), различные памятки (leaflets/pamphlets), содержащие полезную для участников информацию.

Основные сведения о конференции обычно содержатся в буклете-программе (program booklet). Оперативная информация размещается на досках объявлений (notice boards) и демонстрационных щитах (bulletin boards). На представительских научных форумах выпускаются бюллетени новостей (news bulletins). Об их содержании и периодичности выхода можно узнать из программы конференции: “News Bulletins will be issued as required. Watch for them at the Registration desks. They will contain late program changes and special announcements of interest to the delegates”.

К услугам всех прибывших на конференцию справочное бюро (information desk), где можно получить исчерпывающую консультацию по разным вопросам, связанным с обслуживанием участников и проведением ими свободного времени. На это обращает внимание следующее объявление: «The Information Desk consults the attendees for all general information including:
entertainment, dining out, sightseeing, transportation, Internet and (photocopier) facilities».

В здании, где проходит конференция, обычно работает машинописное бюро (typing pool), почтовое отделение (post office), транспортное агентство (travel agency). К услугам участников различные точки питания (cafeterias/snack bars/refreshment areas). Их информируют о том, где они могут вкусно и относительно недорого поесть: «Meals will be

available at the University Cafeteria. Excellent meals in good restaurants may be obtained at reasonable prices».

Как правило, в качестве места проведения конференции (conference premises/sits) выбирается специально предназначенное для этого здание (conference/congress/convention centre), отель (hotel) или территория университета (university campus). Конференция на базе университета (university conference), естественно, дешевле и для организаторов, и для участников в смысле их размещения (accommodation/housing): “Accommodation is available at the university campus in inexpensive student rooms”.

В распоряжение участников предоставляются лекционные залы (lecture halls), комнаты для заседаний (meeting rooms), оборудуются специальные помещения – холлы (lounges) для неофициального общения.

На научных конференциях широко используется современное звукоусилительное (public address system) и аудиовизуальное оборудование (audiovisual equipment): слайдпроекторы (slide projectors), видеомагнитофоны (videorecorders), power point системы. При демонстрации экспериментов в лабораторных условиях эффективно работает система замкнутого телевидения (closed circuit television).

Для участников научной конференции обычно разрабатываются две программы: научная (scientific/technical program) и культурная (social program).

Начинается конференция специальным заседанием (ceremonial session/opening ceremony). Открывается конференция, как правило, приветственной речью (welcome address) одного из руководителей конференции. Нередко открытие конференции проходит в деловой обстановке. В этом случае председательствующий на заседании ограничивается вступительным словом (introductory/opening remarks).

На пленарных заседаниях (plenary sessions) выступающие (speakers) представляют соответственно пленарные доклады (plenary addresses/lectures/talks/papers) и в ряде случаев основные доклады, определяющие ход всей конференции (keynote addresses/papers). Основной докладчик (keynote speaker) является, как правило, известным ученым, признанным авторитетом в своей области: «The keynote speaker will be Professor Brown, a distinguished economist from the University of London, who will talk about the past, present and future of economics».

Большой аудитории обычно адресуются обзорные (overview/review papers) и отчетные доклады (reports).

Нередко организационный комитет представляет участникам возможность провести незапланированное заседание (impromptu meeting), если те высказывают такое пожелание. Об этом можно узнать, например, из такого объявления: «Groups wishing to hold impromptu meetings in the evening after the regular program may ask for room assignment from the Mexican Local Organizing Committee».

В основном все представленные на конференцию научные доклады (papers/scientific contributions) можно разделить на доклады по приглашению (invited/solicited papers) и доклады, заявленные по инициативе самих участников (contributed/free/uninvited papers). Последние, как правило, составляют программу параллельно идущих секционных заседаний (concurrent/parallel sessions), часто называемых симпозиумами (symposia): “The meeting contains 90 invited papers and 230 contributed papers organized into 24 symposia”.

Отдельные доклады могут носить образовательный (обучающий) характер (tutorial papers): “The program will consist of invited and contributed papers, as well as workshop sessions. Some of invited papers will be tutorial in nature”.

Возможен и такой вариант, когда предложенные темы обсуждаются до конференции в рабочих группах (working

parties/groups), а затем представители этих групп (rapporteurs of working parties/groups) делают основные доклады (lead papers) на пленарных заседаниях: «The lead papers presented in plenary sessions represented experience in several different countries as well as in international institutions».

При ограничении во времени, особенно при отсутствии параллельных заседаний, один докладчик (repporteur of grouped papers) представляет ряд докладов в сгруппированном виде.

Иногда проводятся совместные заседания (joint meeting) отдельных секций или даже конференций, чтобы их участники, представители разных областей науки, могли обсудить общие проблемы.

На конференциях нередко устраиваются специальные лекции (special lectures) для участников, а также публичные лекции (public lectures) для всех желающих, с которыми выступают известные ученые или общественные деятели.

Важным элементом любой научной конференции является обсуждение докладов, или дискуссия (discussion), которой обычно руководит председатель заседания (chairman of the session/session chairman).

Используется и такая форма, как обмен мнениями с участием ведущих специалистов в присутствии широкой аудитории (panel discussion). Выступающие на этой встрече (panelists/members of the panel) освещают темы, предлагаемые ее ведущим (chairman of the panel discussion), и отвечают на вопросы коллег.

Проводятся на научных конференциях и обсуждения за «круглым столом» (round table discussions/round tables).

В последние время стали пользоваться успехом стендовые заседания (poster sessions), во время которых авторы-демонстраторы (presenters) представляют так называемые стендовые сообщения (posters/poster papers/poster presentations).

Обычно параллельно с проведением конференции организуются тематические выставки (exhibitions/exhibits/displays), в том числе имеющие коммерческий интерес (commercial exhibitions): “There will be a commercial exhibition of ultrasound equipment with the conference. Companies interested in exhibiting should contact the Conference organizer”; устраиваются демонстрации оборудования, приборов и материалов (shows/demonstrations): “The Physics show, where manufacturers present the latest models of research instruments, apparatus and materials, will be organized by the American Institute of Physics”.

Гости конференции имеют возможность принять участие в разного рода профессиональных экскурсиях (professional/technical excursions), в том числе полевых экскурсиях (field excursions/trips).

Успех научной конференции во многом определяется и тем, как подготовлена культурная программа и составляющие ее разнообразные мероприятия (social events), ибо именно в свободное время между участниками устанавливаются контакты, столь необходимые для плодотворного научного общения.

Гости конференции посещают местные музеи (museums), картинные галереи (art galleries), театры (theatres) и концертные залы (concert halls).

2.1.1. Study the types of conferences

Type	Definition	Examples
Conference	The most general term to indicate a meeting for discussion – most commonly adopted by associations and organizations for their regular meetings. It is usually associated with the most traditional type of presentation, that is, papers followed by questions.	Annual Conference of the Society for French Studies Biennial Conference of the Society for Italian Studies
Symposium	Nowadays, this describes a meeting to discuss a particular subject, but its original meaning defines it as a drinking party devoted to conversation and following a banquet. A symposium thus has a slightly more informal character than a conference.	Primer Simposio De Lingüîstica Hispànica - Reino Unido
Seminar	The first meaning of this term refers to a group of students studying under a professor with each doing research and all exchanging results through reports and	Italian as a foreign language Perdita Project Seminar

	discussions. Its second definition: 'debating special issues' preserves the conversational character of the term 'seminar'	
Colloquium	This term indicates both a traditional conference and a conversational seminar. Colloquia tend to privilege the aspects of debate.	The Sociology of Language and Religion
Workshop	Taken from the language of manufacturing, the term workshop indicates a brief intensive educational program for a small group of people that focuses on techniques and skills in a particular field. In academia, it is adopted to describe meetings reserved for small groups of specialists who come together for concerted activities or discussion.	Translation and Theories: East and West
Roundtable	The roundness of the table clearly symbolizes the equality of all participants. Each of them will have the same right to take the floor.	The Syntax of Tense and Aspect Third International Round-Table on Urban

	Roundtables commonly bring together academics who usually are invited as key-note speakers. Discussion nevertheless plays the leading role in this kind of meeting.	Environmental History of the 19th and 20th Century

2.1.2. Match English words and word-combinations with the corresponding Russian ones

1. To take place; 2. committee chairman; 3. secretary-general; 4. call for papers; 5. short abstract; 6. extended extract; 7. summary of the presentation; 8. manuscript of the paper; 9. attendee; 10. accommodation; 11. information desk; 12. key-note speaker; 13. session; 14. review paper; 15. exhibition; 16. proceedings of the conference; 17. scientific associate; 18. full member of the Academy of Science; 19. to lecture; 20. to take the floor; 21. to take part in; 22. poster session; 23. scientific contribution; 24. contributed paper; 25. digest panel discussion.

1. Стендовое заседание; 2. справочное бюро; 3. научный доклад; 4. обзор материалов; 5. основной докладчик; 6. иметь место; 7. сборник материалов конференции; 8. выступить; 9. принимать участие; 10. читать лекцию; 11. председатель комитета; 12. автореферат; 13. участник; 14. генеральный секретарь; 15. краткий тезис; 16. действительный член Академии наук; 17. подробный тезис; 18. заседание; 19. выставка; 20. научный сотрудник; 21. рукопись доклада; 22. дискуссия с участием ведущих специалистов; 23. место проживания; 24. приглашение на присылку материалов для публикации; 25. научный вклад.

2.1.3 Arrange in pairs the words which are close in meaning

1. participant, accommodation, speaker, to take place, exhibition, scientific associate, head, deputy director, to take the floor, to present a paper, seminar, overview paper, concurrent session, round table discussions.
2. to submit a paper, display, assistant director, round tables, attendee, reporter, chief, workshop, housing, research associate, review paper, parallel session, to be held, to speak.

2.1.4 Arrange the following words in pairs of antonyms

1. success, dependence, in general, interested, significance, order, approximately, to win, up-date equipment, theoretician, formal discussion, include.
2. exclude, out-date equipment, failure, disinterested, disorder, accurately, practitioner, independence, in particular, insignificance, to lose, informal discussion.

2.2. Making a speech

1. Do you have any experience in speech making? Is it positive or not?
2. Study the main principles of speech making

The contents of your speech, and how you deliver it, are based on three important factors:

The Occasion

The occasion will dictate not only the content of your speech, but also the duration, the tone, and the expectations of your audience. For example, humour may be inappropriate during a business presentation or a eulogy, while it may be welcome during a wedding speech, or a sports event.

The Audience

If you are familiar with your audience, then your speech should acknowledge and build upon your existing intimacy with your audience. The use of names and personal details of members of your audience can help to engage your listeners.

If the speech is to an unfamiliar audience then an early goal of your speech must be to build a degree of trust with the listeners.

The Purpose of Your Speech

By setting out a few clear goals before you start writing your speech, you will be better equipped to judge its progress and success of your speech prior to its public airing.

The Structure

Most good writing must have structure. A good speech is no exception. By providing your speech with a beginning, middle, and an end, you will have laid the foundations for a successful speech that fulfils all of your aspirations.

We will now cover each of these areas:

The Beginning

The first thirty seconds of your speech are probably the most important. In that period of time you must grab the attention of the audience, and engage their interest in what you have to say in your speech.

This can be achieved in several ways. For example you could raise a thought-provoking question, make an interesting or controversial statement, recite a relevant quotation or even recount a joke.

Once you have won the attention of the audience, your speech should move seamlessly to the middle of your speech.

The Body

The body of your speech will always be the largest of your speech. At this point your audience will have been introduced to you and the subject of your speech (as set out in your opening)

and will hopefully be ready to hear your arguments, the subject of your speech.

The best way to set out the body of your speech is by formulating a series of points that you would like to raise. In the context of your speech, a "point" could be a statement about a product, a joke about the bridegroom or a fond memory of the subject of a eulogy.

The points should be organized so that related points follow one another so that each point builds upon the previous one. This will also give your speech a more logical progression, and make the job of the listener a far easier one.

Don't try to overwhelm your audience with countless points. It is better to have fewer points that you make well than to have too many points, none of which are made satisfactorily.

The Closing

Like your Opening, the Closing of your speech must contain some of your strongest material. You should view the closing of your speech as an opportunity. It is an opportunity to:

- Summarise the main points of your speech
- Provide some further food for thought for your listeners
- Leave your audience with positive memories of your speech
- Choose the final thought/emotion.

Scripts, Notes or Memory?

It's now time to prepare to deliver your speech. If you are nervous or inexperienced, you will probably want to choose to read your speech from a script or from notes.

Reading From a Script

Reading your entire speech from a script may give you confidence and ensure that nothing is forgotten or omitted, however it is the least desirable option for delivering your speech. You will find it more difficult to see your audience, and make it

harder for them to get involved to you. When reading from a script it is extremely difficult to deliver your speech to your audience, rather than just read it aloud.

Using Notes

If you are not confident enough to recited your speech from memory, then the use of notes is a much more desirable option than using a complete script. Your notes should consist of the keywords or points of your speech – a skeleton of thoughts or words around which you can build your speech. You may refer to your notes occasionally to maintain the thread of your speech, while for the most part of you will be able to speak directly to the audience.

Reciting From Memory

You may prefer to recite from memory. However you should only do this if you are comfortable speaking publicly, and not prone to loss of concentration (or memory!). As with reading from a script, you should be careful not to lapse into a monotonous recitation of your speech.

Speech Delivery Tips

- Make sure that your appearance is well presented
- Speak clearly, and adjust your voice so that every one can hear you. Don't shout for the sake of being loud
- It is common to speak rapidly when nervous, try to take your time speaking
- Effectively used, a pause in your speech can be used to emphasize a point, or to allow the audience to react to a fact, anecdote or joke
- Make eye contact with your audience. This helps to built trust and a relationship between the speaker and the listeners

- Do no fidget or make other nervous gestures with your hands. – Do not keep your hands in your pockets. Do use hand gestures effectively
- Be yourself; allow your own personality to come across in your speech

2.3. Mind useful language while making a speech

Introducing yourself:	•Good morning everyone.
	•Let me introduce myself. My name is
	•I'm a specialist in
Structuring the presentation:	I'm going to divide my talk into four parts.
	First I'll give you…; after that…; finally
Inviting questions:	If you have any questions, don't hesitate to ask.
	I'll be glad to answer any questions (at the end of my talk)
Giving background information:	I'll give you some background information.
	Let's start with the background
Changing the topic:	Right, let's now move on to_
	O.K. I'll now look at_____
Concluding:	To sum up…
	So to summarise…

Referring to visuals:	If you look at the graph…
	Could I draw your attention to the chart?
	If you take a look at the first year, you'll see…
Visuals:	If you look at the graph
	Could I draw your attention to the chart?
	If you take a look at the first year, you'll see…
Ending:	Thanks very much. Any questions?
	Well, that's all I have to say
	Thank you for listening

2.3.1. Making a speech escape jargon: «Words and expressions to avoid»

Jargon	Preferred Usage	Jargon	Preferred Usage
a majority of	most	it is suggested that	I think
a number of	many	it is worth pointing out	note that
accounted for by the fact	because	it may be that	I think
along the lines of	like	it may, however, be	
be of the same opinion	agree	noted that	but
as a consequence of	because	lacked the ability to	couldn't
as a matter of fact	in fact	large in size	large
as is the case	as happens	of great theoretical and	
at an earlier date	previously	practical importance	useful
at the present time	now	on account of	because
based on the fact that	because	on behalf of	for
by means of	by, with	on the basis of	by
completely full	full	on the grounds that	since, because
definitely proved	proved	on the part of	by, among, for
despite the fact that	although	owing to the fact that	since, because
due to the fact that	because	perform	do
during the course of	during, while	pooled together	pooled
end result	result	prior to	before
fabricate	make	quite unique	unique
fewer in number	fewer	rather interesting	interesting
first of all	first	red in color	red
for the purpose of	for	referred to as	called
for the reason that	since, because	relative to	about
give rise to	cause	smaller in size	smaller
has the capability of	can	subsequent to	after
in a number of cases	some	sufficient	enough
in a position to	can, may	take into consideration	consider
in a satisfactory manner	satisfactorily	terminate	end

in a very real sense	in a sense	the great majority of	most
in case	if	the opinion is advanced	
in close proximity	close, near	that	I think
in connection with	about,	the question as to	whether
in order to	to	there is reason to believe	I think
in relation to	toward, to	this result would seem	
in respect to	about	to indicate	this result indicates
in some cases	sometimes	through the use of	by, with
in terms of	about	ultimate	last
in the event that	if	utilize	use
in the possession of	has, have	was the opinion that	believed
in view of	because, since	ways and means	ways, means
inasmuch as	for, as		(not both)
initiate	begin, start	we wish to thank	we thank
is defined as	is	whether or not	whether
it has been reported by F	F reported	with a view to	to
it has long been known	I haven't to look up the	with reference to	about
		with regard to	concerning, about
it is apparent that	apparently		
it is believed that	I think	with respect to	about
it is clear that	clearly	with the possible	
it is doubtful that	possibly	exception of	except
it is of interest to note	(leave out)	with the result that	so that
it is often the case that	often		

2.3.2. Make a speech of your own on the topic of your research work.

3. Summarizing

3.1. Read the following text

В практической деятельности специалистов часто возникает необходимость ознакомления с обширными по объему иностранными материалами, перевод которых занимает много времени. В этом случае прибегают к кратному изложению содержания этих материалов – составлению реферата (summary). Реферат, как экономное средство ознакомления с материалом, отражает его содержание с достаточной полнотой. Реферат не только раскрывает важные стороны содержания, но и показывает читателю, имеет ли для него смысл полностью или частично проштудировать данный источник информации в оригинале.

Составление рефератов (реферирование) представляет собой процесс аналитико-синтетической переработки первичного документа, при котором во вторичном документе - реферате - излагается основное содержание первичного документа, приводятся данные о характере работы, методике и результатов исследования, а также месте и времени исследования.

Объектом реферирования является преимущественно научная, техническая и производственная литература. На остальные виды публикаций, как правило, составляются только аннотации и библиографические описания.

Различие между аннотацией и рефератом определяется их назначением. Аннотация предназначена только для информации о существовании первичного документа определенного содержания и характера, а реферат служит для изложения основного содержания первичного документа.

Содержание и структура реферата. Реферат состоит из следующих элементов:

1. заглавия реферата; 2. библиографического описания реферируемого документа; 3. текста реферата.

Заглавием реферата, как правило, служит заглавие реферируемого документа. Если заглавие документа не отражает основного смысла содержания этого документа, то дается другое, более точное (смысловое) заглавие.

В тексте реферата отражаются следующие данные:

1. исследуемая проблема, цель, главная мысль и содержание работы, предмет или цель исследования;

2. данные о методике и ее сравнительной точности (при этом широко известные методы не отмечаются);

3. выводы автора и указания возможностей и путей практического применения результатов работы;

4. ссылка на наличие библиографии и иллюстративного материала (если их нет в библиографическом описании);

5. технология, применяемое оборудование и условия проведения исследования;

6. таблицы, схемы, графики, формулы, необходимые для уяснения основного содержания документа;

7. необходимые справочные данные (об авторе, истории вопроса, месте проведения исследования и т.д.).

В соответствии со спецификой реферируемого документа в реферате могут содержаться не все эти данные, а какая-то их часть.

Реферирование - это сложный, творческий процесс, построенный на проникновении в сущность излагаемого. В процессе реферирования происходит не просто сокращение текста, а существенная переработка содержания, композиции и языка оригинала:

- в содержании выделяется главное и излагается сокращенно, сжато;
- однотипные факты группируются, и им дается обобщенная характеристика;
- цифровые данные систематизируются и обобщаются;

- если основная мысль сформулирована недостаточно четко, она должна быть конкретизирована и выделена в реферате;

- в случае необходимости происходит перемещение временных планов в последовательности от прошлого к будущему;

- язык оригинала претерпевает изменения в сторону нормативности, нейтральности, простоты и лаконичности. Исключаются образные выражения, эпитеты, вводные слова, не существенные определения, обстоятельства, дополнения. Происходит разукрупнение сложных синтаксических конструкций, сокращение количества придаточных предложений, замена их более простыми оборотами.

Информативность как основное содержание жанра реферата как бы "просачивается" через все языковые элементы и их значения и в то же время соединяет их в цельную структуру.

Реферирование - это так же сложное комплексное умение, состоящее из целого ряда отдельных элементов. На протяжении всего курса обучению английскому языку вы выполняли многие упражнения, нацеленные на отработку этих элементов. Это:

1. выделение абзацев, содержащих основную информацию; 2. выделение основных мыслей, фактов, положений; 3. озаглавливание выделенных абзацев; 4. составление плана статьи; 5. сокращение текста; 6. передача содержания текста своими словами (перифраз).

Расчленяя текст на смысловые куски, вы учились анализировать содержание; озаглавливание этих кусков и составление плана учило синтезировать отдельные элементы текста; сокращение текста формировало навык отделять основное от второстепенного; перифраз учил передавать одну и ту же мысль разными средствами.

3.1.1. Remember the following algorithm of summarizing:

1. Brief reading and overview of the text/Беглый просмотр текста и ознакомление с его общим смыслом.

2. Более внимательное чтение текста, определение значения незнакомых слов по контексту или по словарю.

3. Смысловой анализ текста и распределение материала статьи на три группы по степени его важности:

I группа	II группа	III группа
Наиболее важные сообщения, требующие полного и точного отражения в реферате	Второстепенная информация, передаваемая в более сокращенном виде	Малозначимая информация, которую можно опустить

3.1.2. Learn the following words and word-combinations used for retelling of the
text and its summarizing

I

1. данная статья	- the present paper
2. тема	- the theme (subject-matter)
3. основная проблема	- the main (major) problem
4. цель	- the purpose
5. основной принцип	- the basic principle
6. проблемы, связанные с	- problems relating to; problems of
7. аналогично	- similarly; likewise

8. поэтому, следовательно, в результате этого - hence; therefore
9. наоборот - on the contrary
10. тем не менее - nevertheless; still; yet
11. кроме того - besides; also; again; in addition; furthermore
12. сначала - at first
13. далее, затем - next; further; then
14. наконец, итак - finally
15. вкратце - in short; in brief

II

Цели написания статьи:

1. The object (purpose) of this paper is to present (to discuss, to describe, to show, to develop, to give)…
2. The paper (article) puts forward the idea (attempts to determine) …

Вопросы, обсуждаемые в статье:

1. The paper (article) discusses some problems relating to (deals with some aspects of, considers the problem of, presents the basic theory, provides information on, reviews the basic principles of) …
2. The paper (article) is concerned with (is devoted to) …

Начало статьи:

1. The paper (article) begins with a short discussion on (deals firstly with the problem of) …
2. The first paragraph deals with …
3. First (At first, At the beginning) the author points out that (notes that, describes)…

Переход к изложению следующей части статьи:

1. Then follows a discussion on …

2. Then the author goes on to the problem of …

3. The next (following) paragraph deals with (presents, discusses, describes) …

4. After discussing … the author turns to …

5. Next (Further, Then) the author tries to (indicates that, explains that) …

6. It must be emphasized that (should be noted that, is evident that, is clear that, is interesting to note that) …

Конец изложения статьи:

1. The final paragraph states (describes, ends with) …
2. The conclusion is that the problem is …
3. The author concludes that (summarizes the) …
4. To sum up (To summarize, To conclude) the author emphasizes (points out, admits) that …
5. Finally (In the end) the author admits (emphasizes) that …

Оценка статьи:

In my opinion (To my mind, I think) …

The paper (article) is interesting (not interesting), of importance (of little importance), valuable (invaluable), up-to-date (out-of-date), useful (useless)…

3.1.3. Make a summary of any article you are interested in using the summarizing algorithm.

3.2. Abstract writing

Сущность и назначение аннотаций. Сущность аннотаций заключается в том, что она дает предельно сжатую характеристику материала, излагая содержание оригинала в виде перечня основных вопросов и иногда давая критическую оценку. Она имеет чисто

информационное или справочно-библиографическое назначение. Аннотация (abstract), в отличие от реферата (summary), не раскрывает содержание материала, а лишь сообщает о наличии материала на определенную тему, указывает источник и дает самое общее представление о его содержании. Аннотация должна дать читателю предварительное представление о незнакомой ему публикации и тем самым помочь ему в поиске необходимой информации.

Виды аннотаций. Различают два типа аннотаций: справочная (описательная) и рекомендательная.

Справочная аннотация имеет наибольшее распространении в научно-информационной деятельности и особенно при аннотировании публикаций, изданных на иностранном языке. Справочная аннотация предназначена для быстрого и беглого просмотра, поэтому краткие аннотации предпочтительнее подробных. Для справочных аннотаций характерно сочетание конкретности и достаточной полноты с определенным лаконизмом изложения.

Рекомендательные аннотации имеют целью не только дать предварительное представление о документе, но также и заинтересовать читателя и показать место данной публикации среди других публикаций на аналогичную тематику. Основное назначение рекомендательной аннотации – оценка документа.

Требование сжатости и лаконичности, предъявляемое к справочной аннотации, не имеет для рекомендательной аннотации особого значения. В рекомендательной аннотации должны органически сочетаться характеристика содержания аннотируемого произведения с характеристикой автора, разъяснением значения и сущности трактуемых вопросов, их актуальности и интереса.

3.2.1. Remember the following algorithm of abstract writing

1. The title/ Название работы на иностранном языке, перевод названия. Фамилия и инициалы автора на иностранном языке.

2. Output data/Выходные данные. Название журнала на иностранном языке, номер и год издания, место издания, том и количество страниц, количество рисунков, таблиц.

3. The list of issues/ Перечень основных проблем, затронутых в работе.

4. Paper evaluation/ Характеристика и оценка аннотируемой работы.

Remember the following:

Установлено, что основная информация содержится: 1) в ссылках, графиках, таблицах; 2) в последнем и предпоследнем абзацах каждого раздела; 3) в первых трех абзацах; 4) в надписях к рисункам и таблицам.

3.2.2 Abstracting

1. Abstract
An abstract is a summary of a body of information. Sometimes, abstracts are in fact called summaries—sometimes, executive summaries or executive abstracts. There are two types of abstracts: the descriptive abstract and the informative abstract.

Descriptive Abstracts

The descriptive abstract provides a description of the report's main topic and purpose as well an overview of its contents. As you can see from the example, it is very short—usually a brief one- or two-sentence paragraph. Usually, it appears on the title page. In this type of abstract, you don't summarize any of the facts or conclusions of the report.

Example 1

> Max Weber, historiography, medical knowledge, and the formation of medicine
> Fran M. Collyer
> Abstract
> This paper applies Max Weber's proposition regarding the differences between the 'sciences' to the 'historicist controversy': the problems emerging from opposing approaches to understanding the past. The historiography in question is the development of the 'biomedical model' of health and disease, and the rise of 'medicine' in the course of 19th century Europe and Britain. While Weber's theoretical framework does not answer the questions posed by present-day scholars about specific historical events, it enables a critique of the process through which history is 'constructed', and offers an alternative approach to the 'transformation' of 19th century medicine.

Informative Abstracts

The informative abstract, as its name implies, provides information from the body of the paper — specifically, the key facts and conclusions. To put it another

way, this type of abstract summarizes the key information from every major section in the body of the paper.

The requirements for the informative abstract are as follows:

. Summarizes the key facts, conclusions, and other important information in the body of the report.

. Usually about 10 percent of the length of the full report: for example, an informative abstract for a 10-page report would be 1 page. This ratio stops after about 30 pages, however. For 50- or 60-page reports, the abstract should not go over 3 to 4 pages.

. Summarizes the key information from each of the main sections of the report, and proportionately so (a 3-page section of a 10-page report ought to take up about 30 percent of the informative abstract).

. Phrases information in a very dense, compact way. Sentences are longer than normal and are crammed with information. The abstract tries to compact information down to that 10-percent level. It's expected that the writing in an informative abstract will be dense and heavily worded. (However, do not omit normal words such as the, a, and an.

. Omits introductory explanation, unless that is the focus of the main body of the report. Definitions and other background information are omitted if they are not the major focus of the report. The informative abstract is not an introduction to the subject matter of the report—and it is notan introduction!

• Omits citations for source borrowings. If you summarize information that you borrowed from other writers, you do not have to repeat the citation in the informative abstract (in other words, no brackets with source numbers and page numbers).

. Includes key statistical detail. Don't sacrifice key numerical facts to make the informative abstract brief. One expects to see numerical data in an informative abstract.

. Omits descriptive-abstract phrasing. You should not see phrasing like this: "This report presents conclusions and recommendations from a survey done on grammar-checking software." Instead, the informative abstract presents the details of those conclusions and recommendations.

Study the difference between the informative and descriptive phrasing in the following example of informative abstract:

Example 2

Palmquist, M., & Young, R. (1992). The Notion of Giftedness and Student Expectations About Writing. Written Communication, 9(1), 137-168.

Research reported by Daly, Miller, and their colleagues suggests that writing apprehension is related to a number of factors we do not yet fully understand. This study suggests that included among those factors should be the belief that writing ability is a gift. Giftedness, as it is referred to in the study, is roughly equivalent to the Romantic notion of original genius. Results from a survey of 247 postsecondary students enrolled in introductory writing courses at two institutions indicate that higher levels of belief in giftedness are correlated with higher levels of writing apprehension, lower self-assessments of writing ability, lower levels of confidence in achieving proficiency in certain writing activities and genres, and lower self-assessments of prior experience with writing instructors. Significant differences

in levels of belief in giftedness were also found among students who differed in their perceptions of the most important purpose for writing, with students who identified "to express your own feelings about something" as the most important purpose for writing having the highest mean level of belief in giftedness. Although the validity of the notion that writing ability is a special gift is not directly addressed, the results suggest that belief in giftedness may have deleterious effects on student writers.

3.2.3. Write an abstract of your own article, using an abstract writing algorithm.

4. Texts for reading, translating and summarizing.

Biology .

Text 1.

Stem Cells Battle for Space

ScienceDaily (Dec. 4, 2009) — The body is a battle zone. Cells constantly compete with one another for space and dominance. Though the manner in which some cells win this competition is well known to be the survival of the fittest, how stem cells duke it out for space and survival is not as clear. A study on fruit flies published in the October 2 issue of Science by Johns Hopkins researchers describes how stem cells win this battle by literally sticking around.

"Our work exemplifies how one signal coordinately maintains two types of stem cells in a single niche, or microenvironment," says Erika Matunis, Ph.D., associate professor of cell biology at the Johns Hopkins School of Medicine. "What we found may emerge as common themes of mammalian stem cell niches as they become better characterized."

To tackle the stem cell competition quandary, the team looked at fruit fly testes where two different stem cells exist: germline stem cells which give rise to sperm, and somatic stem cells which develop into non-reproductive cell types.

Using genetics, the researchers grew flies lacking the SOCS protein, which controls other molecules that promote stem cell growth. SOCS normally ensures that the right numbers of stem cells are present in the stem cell niche, a region at the far end of the fly testis where new cells are born. In a normal testis, the germline stem cells are surrounded by

somatic stem cells at a ratio of about one germline stem cell for every two somatic stem cells.

The researchers isolated testes from flies lacking SOCS and, under a microscope, counted the number of germline stem cells and somatic stem cells. They found that nearly half of the germline stem cells were gone and the somatic stem cells appeared to be occupying that space.

"The somatic stem cells almost look like they've invaded the niche area," says Melanie Issigonis, a graduate student in the Biochemistry, Cellular, and Molecular Biology graduate program at Johns Hopkins. "I saw that image and said, 'Wow, it's right there. Germline stem cell loss.'"

To figure out where the lost germline stem cells went and how they lost the battle for space, the team returned to the microscope. This time, they examined the cells for whether they contained integrin, a protein that helps cells stick to each other. They found that somatic stem cells from flies lacking SOCS seemed to contain more integrin than somatic stem cells from flies with functional SOCS. According to Matunis, it's the increase in integrin that allows somatic stem cells to gain the upper hand because they can stick to the niche better than neighboring germline stem cells can.

Though the somatic stem cells were invading the niche, germline stem cells were not dying. In the microscope images, the team found that all remaining germline stem cells still looked alive and healthy, but elbowed out of their niche by somatic stem cells. Says Matunis, no matter how healthy a germline stem cell is, if it cannot stick, it will eventually be outcompeted by the somatic cells and pushed all the way out of the niche. Issigonis found the discovery remarkable: "The germline stem cells are perfectly fine," she says. "They're just leaving the niche and differentiating."

The team believes this model can be applied to other stem cell niches such as cancer. Just like the somatic stem cells

overrunning the fly testes, cancer stem cells in mammalian systems become a danger when they become the stickiest cell in the niche. In both cases, the important control protein, SOCS, is lost. Knowing what is necessary for some stem cells to thrive and others to dwindle could have great importance to understanding the roots of stem cell diseases.

This study was funded by the National Institutes of Health and a grant from the March of Dimes.

Authors of the text were Melanie Issigonis, Margaret de Cuevas, Laurel Sandler, and Erika Matunis, all of Johns Hopkins, Natalia Tulina of University of Pennsylvania School of Medicine, and Crista Brawley of University of Chicago.

Text 2.

Key Molecule for Stem Cell Pluripotency Discovered

ScienceDaily (May 27, 2011) — Researchers of the Max Delbrück Center for Molecular Medicine (MDC) Berlin-Buch have discovered what enables embryonic stem cells to differentiate into diverse cell types and thus to be pluripotent. This pluripotency depends on a specific molecule -- E-cadherin -- hitherto primarily known for its role in mediating cell-cell adhesion as a kind of "intracellular glue." If E-cadherin is absent, the stem cells lose their pluripotency. The molecule also plays a crucial role in the reprogramming of somatic cells (body cells) into pluripotent stem cells.

Dr. Daniel Besser, Prof. Walter Birchmeier and Torben Redmer from the MDC, a member of the Helmholtz Association, used mouse embryonic fibroblasts (MEFs) in their stem cell experiments. In a first step they showed that the pluripotency of these stem cells is directly associated

with the cell-adhesion molecule E-cadherin. If E-cadherin is absent, the stem cells lose their pluripotency. In a second step the researchers investigated what happens when somatic cells that normally neither have E-cadherin nor are pluripotent are reprogrammed into a pluripotent stem cell state. In this reprogramming technique, somatic cells are converted into induced pluripotent stem cells (iPSCs). This new technique may help researchers avoid the controversies that come with the use of human embryos to produce human embryonic stem cells for research purposes.

The MDC researchers found that in contrast to the original cells, the new pluripotent cells derived from mouse connective tissue contained E-cadherin. "Thus, we have double proof that E-cadherin is directly associated with stem-cell pluripotency. E-Cadherin is necessary for maintaining pluripotent stem cells and also for inducing the pluripotent state in the reprogramming of somatic cells," Dr. Besser said. "If E-cadherin is absent, somatic cells cannot be reprogrammed into viable pluripotent cells." In addition, E-Cadherin can replace OCT 4, one of the signaling molecules until now considered indispensable for reprogramming.

Next, the MDC researchers want to find out to what extent E-cadherin also regulates human embryonic stem cells. "Understanding the molecular relationships is essential for using human somatic cells to develop stem cell therapy for diseases such as heart attack, Alzheimer's or Parkinson's disease or diabetes," Dr. Besser said.

Text 3.

Therapeutic Cloning Gets A Boost With New Research Findings

ScienceDaily (Mar. 25, 2009) — Germ cells, the cells which give rise to a mammal's sperm or eggs, exhibit a five to ten-fold lower rate of spontaneous point mutations than adult somatic cells, which give rise to the body's remaining cell types, tissues and organs. Despite their comparatively higher mutation rates, however, adult somatic cells are used as the donor cells in a cloning process called somatic cell nuclear transfer (SCNT). This made researchers wonder if cloning by SCNT leads to progeny with more mutations than their naturally conceived counterparts. Also, would cloned fetuses receive DNA programming predisposing them to develop mutations faster than natural fetuses of the same age?

Those scenarios are simply not likely, say researchers at The University of Texas at San Antonio, The University of Texas Health Science Center at San Antonio and The University of Hawaii at Honolulu's John A. Burns School of Medicine. The team, which spent more than five years analyzing mutation rates and types in cloned Big Blue® mouse fetuses recently published its findings in the online Early Edition of the Proceedings of the National Academy of Sciences in a paper titled "Epigenetic regulation of genetic integrity is reprogrammed during cloning."

The paper offers the first direct demonstration that cloning does not lead to an increase in the frequency of point mutations.

John McCarrey, professor of cellular and molecular biology at UTSA and the study's principal investigator, suggests a "bottleneck effect" is partially responsible for the

observations his team recorded. "To create a cloned fetus by somatic cell nuclear transfer, only one adult somatic cell -- one donor cell -- is needed," he explains. "Because a random cell population exhibits a low mutation rate overall and only one cell from that population is used for cloning, the likelihood is remote that the cell chosen to be cloned will transfer a genetic mutation to its cloned offspring. Therefore, the bottleneck effect limits the transfer of mutations from donor cells to cloned offspring."

Not only did the researchers find that SCNT does not lead to an increase in the frequency of point mutations in cloned mice, the team also found that naturally conceived fetuses and cloned fetuses that are the same age have similar rates of spontaneous mutation development. They attribute this finding to epigenetic reprogramming.

It is known in the scientific community that germ cells contain an epigenome, a programmed state of the genome, that keeps mutation rates low. They suggest this type of epigenome is found in germ cells because those cells are responsible for contributing genetic information to subsequent generations. Adult somatic cells (the donor cells in SCNT) have higher mutation rates and less stringent epigenetic programming to avoid mutations than germ cells, but offspring produced from somatic cells by cloning have mutation rates similar to those in offspring produced by natural reproduction, suggesting that the epigenome of an adult somatic cell is reprogrammed during cloning to maintain the genetic integrity of that cell's progeny.

Text 4.

Understanding the Beginnings of Embryonic Stem Cells Helps Predict the Future

ScienceDaily (Oct. 13, 2011) — Scientists have shown that laboratory-grown cells express a protein called Blimp1, which represses differentiation to somatic or regular tissue cells during germ cell development. Studies of these cells show that they also express other genes associated with early germ cell specification.

Ordinarily, embryonic stem cells exist only a day or two as they begin the formation of the embryo itself. Then they are gone.

In the laboratory dish, however, they act more like perpetual stem cells -- renewing themselves and exhibiting the ability to form cells of almost any type, a status called totipotency.

Dr. Thomas Zwaka, associate professor in the Stem Cell and Regenerative Medicine Center at Baylor College of Medicine, and his colleagues here and abroad showed that laboratory-grown cells express a protein called Blimp1, which represses differentiation to somatic or regular tissue cells during germ cell development. Studies of these cells show that they also express other genes associated with early germ cell specification.

A report on their work published online October 13 in the journal *Current Biology*. It will appear in the October 25 print edition of the journal.

"What are embryonic stem cells?" said Zwaka, who is also part of the Center for Cell and Gene Therapy at BCM, Texas Children's Hospital and The Methodist Hospital. "It is quite a surprise that we have them. In the embryo, there is a mass of cells that eventually form the embryo, but they do not

persist. They do not have a program built in that allows them to persist."

To study this, he examined mice. If you put the mass of cells in a Petri dish in the laboratory, they act as thought they are stem cells with the ability for self renewal and totipotency -- the ability to become almost any kind of cell.

Understanding what happens early in development of embryonic stem cells in the laboratory might help make the process of growing them and another, new kind of stem cell called induced pluripotent stem cells -- cells with the potential of becoming many different kinds of tissues that are derived from somatic or adult cells.

"These induced pluripotent stem cells are poorly understood," said Zwaka. "If we know what is happening when we derive embryonic stem cells in the laboratory, it will inform us when we make induced pluripotent stem cells. The end product is similar."

The process of making the induced pluripotent stem cells is noisy and random, he said.

"Every time, the clones look different and emerge at different time points," said Zwaka. By contrast, embryonic development is like clockwork, with events occurring at the same point with each embryo. However, development of embryonic stem cells in the laboratory becomes more disorganized as time goes on.

In the laboratory dish, the mouse embryo continues to develop at a fairly organized rate for two or three days, but when the single cells are separated and grown singly, the embryonic stem cells begin to emerge. Only a tiny subset -- roughly 1 percent -- of the cells become an embryonic stem cell in the laboratory."

"We found that these cells (from the embryonic stem cells come) resemble in almost every feature an early germ cell

(primordial germ cell)," he said. (Primordial germ cells are the source of gametes -- eggs and sperm.)

"It seems that these seeming germ cells are the cells that make the embryonic stem cells in culture," he said. "Germ cells in the embryo are unique and pluripotent (able to become many different kinds of cells) and have a very sophisticated program in them that protects the from becoming somatic cells (specific tissue cells)," he said. "They retain their primitive state." Blimp1 is a master regulator of germ cells.

In the future, he said, he hopes that investigators in both fields can collaborate and learn from one another.

Others who took part in this research include Li-Fang Chua of BCM, M. Azim Surani of the Wellcome Trust Cancer Research UK Gurdon Institute at the University of Cambridge, and Rudolf Jaenisch of Whitehead Institute for BiomedicaI Research at the Massachusetts Institute of Technology in Cambridge.

Funding for this work came from the Huffington Foundation and the National Institutes of Health.

For more information on basic science research at Baylor College of Medicine, please go to From the Lab at Baylor College of Medicine.

Text 5.

HIV Study Identifies Key Cellular Defence Mechanism

ScienceDaily (Nov. 7, 2011) — Scientists have moved a step closer to understanding how one of our body's own proteins helps stop the human immunodeficiency virus (HIV-1) in its tracks.

The study, carried out by researchers at The University of Manchester and the Medical Research Council's National Institute for Medical Research and published in *Nature*,

provides a blueprint for the design of new drugs to treat HIV infection, say the researchers.

Scientists in the United States and France recently discovered that a protein named SAMHD1 was able to prevent HIV replicating in a group of white blood cells called myeloid cells.

Now, crucially, the teams from Manchester and the MRC have shown how SAMHD1 prevents the virus from replicating itself within these cells, opening up the possibility of creating drugs that imitate this biological process to prevent HIV replicating in the sentinel cells of the immune system.

"HIV is one of the most common chronic infectious diseases on the planet, so understanding its biology is critical to the development of novel antiviral compounds," said Dr Michelle Webb, who led the study in Manchester's School of Biomedicine.

"SAMHD1 has been shown to prevent the HIV virus replicating in certain cells but precisely how it does this wasn't known. Our research has found that SAMHD1 is able to degrade deoxynucleotides, which are the building blocks required for replication of the virus.

"If we can stop the virus from replicating within these cells we can prevent it from spreading to other cells and halt the progress of the infection."

Co-author Dr Ian Taylor, from the MRC's National Institute for Medical Research, added: "We now wish to define more precisely, at a molecular level, how SAMHD1 functions. This will pave the way for new therapeutic approaches to HIV-1 and even vaccine development."

The study was funded by the Medical Research Council, the European Union Seventh Framework Programme and the European Leukodystrophy Association.

Text 6.

Why Measles Spreads So Quickly

ScienceDaily (Nov. 2, 2011) — Mayo Clinic researchers have discovered why measles, perhaps the most contagious viral disease in the world, spreads so quickly. The virus emerges in the trachea of its host, provoking a cough that fills the air with particles ready to infect the next host. The findings may also help in the fight against ovarian, breast and lung cancers.

The findings, published online Nov. 2 in the journal *Nature,* give researchers insight into why some respiratory viruses spread more quickly and easily than others: They found the measles virus uses a protein (called nectin-4) in the host to infect and then leave from the strategic location of the throat.

Despite the development of a measles vaccine, the virus continues to affect more than 10 million children each year and kills about 120,000 worldwide. In recent years, the spread of the virus has increased due to lack of people being vaccinated, and measles is still a significant public health problem in the United States.

But why is the measles virus so much more contagious than other respiratory viruses?

"The measles virus has developed a strategy of diabolic elegance," says Roberto Cattaneo, Ph.D., principal investigator of the study and Mayo Clinic molecular biologist. "It first hijacks immune cells patrolling the lungs to get into the host. It then travels within other immune cells everywhere in the body. "However, the infected immune cells deliver their cargo specifically to those cells that express the protein nectin-4, the new receptor. Remarkably, those cells are located in the trachea. Thus, the virus

emerges from the host exactly where needed to facilitate contagion."

The researchers were also excited about another aspect of these findings.

Nectin-4 is a biomarker of several types of cancer such as ovarian, breast and lung. Clinical trials are under way that use measles and other viruses to attack cancer -- including current ovarian, glioma and myeloma clinical trials at Mayo Clinic.

Because measles actively targets nectin-4, measles-based cancer therapy may be more successful in patients whose cancer express nectin-4. Many researchers believe that modified viruses could be a less toxic alternative to chemotherapy and radiation.

Dr. Cattaneo worked with colleagues at the Paul Ehrlich Institute in Germany; Mathieu Mateo, Ph.D., and Chanakha Navaratnarajah, Ph.D., at Mayo Clinic; and other colleagues at the University of Iowa; the Armand Frappier Institute in Montreal, Canada; Inserm/CRCM/University of Aix-Marseille in France; and the National University of Singapore/Duke University.

The research was funded by the National Institutes of Health and by grant agencies in Germany, France, Canada and Singapore.

Text 7.

Gene Therapy Shows Promise as Hemophilia Treatment in Animal Studies

ScienceDaily (Nov. 3, 2011) — For the first time, researchers have combined gene therapy and stem cell transplantation to successfully reverse the severe, crippling bleeding disorder hemophilia A in large animals, opening

the door to the development of new therapies for human patients.

Researchers at Wake Forest Baptist Medical Center's Institute for Regenerative Medicine, collaborating with other institutions, report in *Experimental Hematology* that a single injection of genetically-modified adult stem cells in two sheep converted the severe disorder to a milder form. The journal is a publication of the Society for Hematology and Stem Cells

"A new approach to treating severe hemophilia is desperately needed," said lead author Christopher D. Porada, Ph.D., associate professor of regenerative medicine at Wake Forest Baptist. "About 75 percent of the world doesn't have access to the current treatment -- therapy to replace missing clotting factors. This puts patients in most of the world at risk of severe and permanent disabilities."

Porada cautioned that challenges will need to be overcome before the treatment can be applied to humans, including that the sheep developed an immune response to the therapy that could decrease its effectiveness and duration.

There is currently no cure for the rare bleeding disorder hemophilia. People with this genetic disorder lack a protein, known as a clotting factor, needed for normal blood clotting. As a result, they may bleed for a longer time than others after an injury, as well as bleed internally, especially in joints such as the knees, ankles, and elbows. This bleeding can damage the organs and tissues and be life threatening. Even when life-threatening bleeds are prevented with replacement therapy, it doesn't prevent smaller bleeds within the joints that can cause pain and decreased mobility.

People with hemophilia A, the most common type, are missing clotting factor VIII. For the study, the researchers used a combined stem cell/gene therapy approach to increase levels of factor VIII produced by the animals.

The scientists first inserted a gene for factor VIII into engineered mesenchymal stem cells, a type of adult stem cell. The cells -- acting as a carrier for the gene -- were then injected into the abdominal cavity of the sheep. The scientists selected mesenchymal stem cells to carry the gene because they have the ability to migrate to sites of injury or inflammation.

In the treated animals, the cells migrated to the joints and stopped ongoing bleeding.In addition, all spontaneous bleeding events ceased, and the existing joint damage was completely reversed, restoring normal posture and gait to these crippled animals, and enabling them to resume a normal activity level.

However, a paradox of the treatment was that while the symptoms were eliminated, the sheep developed an immune response to factor VIII, suggesting that the treatment's effects would be reduced or shorter in duration. The scientists are currently working to learn why the immune response occurred and to develop strategies to prevent it.

"While preliminary, these findings could pave the way for a new therapy for hemophilia patients who experience debilitating bleeding in their joints," Porada said.

The research was supported by the National Institutes of Health.

Co-authors were Graça Almeida-Porada (senior author) and Chung-Jung Kuo , both with Wake Forest Baptist; Chad Sanada, Evan Colletti, Esmail D. Zanjani, Walter Mandeville and John Hasenau, all with the University of Nevada at Reno; Robert Moot, Aflac Cancer Center and Blood Disorders Service; Christopher Doering, Emory Children's Center Pediatrics; and H. Trent Spencer, Emory University School of Medicine.

Text 8.

'Protein Microarrays' May Reveal New Weapons Against Malaria

ScienceDaily (Nov. 1, 2011) — A new research technology is revealing how humans develop immunity to malaria, and could assist programs aimed at eradicating this parasitic disease.

Dr Alyssa Barry from the Walter and Eliza Hall Institute's Infection and Immunity division is using 'protein microarray' technology to screen human blood serum samples for immunity to proteins produced by the malaria-causing *Plasmodium falciparum* parasite. Her research, which determines a person's immunity to hundreds of proteins simultaneously, has been published in the journal *Molecular and Cellular Proteomics* this month.

Malaria is a mosquito-borne disease that affects more than 500 million people each year. It causes more than one million deaths, mostly in children under five years of age.

Dr Barry is investigating how humans living in countries where malaria is prevalent, such as Papua New Guinea, establish immunity that protects them from developing malaria.

The malaria parasite has evolved many ways to evade the immune system, Dr Barry said. "We know that one protein, called PfEMP1, that is particularly important for the host immune response can be produced in many different varieties, and these can be altered by the parasite to avoid detection by the immune system."

Dr Barry and colleagues at the Queensland Institute of Medical Research, the Papua New Guinea Institute of Medical Research and the University of California Irvine adapted existing protein microarray technology to allow small samples of human serum (less than one hundredth of a

millilitre) to be tested simultaneously against hundreds of variants of PfEMP1 to determine to which variants the person was immune.

Dr Barry said the testing revealed that in a small region of Papua New Guinea where malaria is endemic, children under the age of two are immune to only a few specific variants of PfEMP1 while older children and adults show immunity to an increasing range of PfEMP1 variants.

"Young children are the most vulnerable to malaria," she said. "Our studies show that this is partly because they have not developed immunity to the many different malaria variants to which they are exposed. As people get older, they become immune to a wider spectrum of malaria parasites, and so when they are infected they develop milder disease and eventually do not develop disease at all, although they can still be infected."

The research team is now undertaking a larger study that will screen more people from other regions of Papua New Guinea, and will screen a wider variety of *Plasmodium* protein variants.

Dr Barry said she hoped the research would lead to the development of a diagnostic test for susceptibility to malaria, and also determine which proteins might be the best to use as the basis for a malaria vaccine. "We currently do not know how people become immune to malaria," she said. "Our protein microarray technology could assist in monitoring malaria control and elimination programs, by showing when a population becomes more susceptible to the disease as a result of waning immunity."

The research was supported by the National Health and Medical Research Council, the National Institutes of Health (US), the Wellcome Trust (UK), the Victorian Endowment for Science Knowledge and Innovation (VESKI), Pfizer Australia, and the Victorian Government. The research was

conducted while Dr Barry was employed by the Burnet Institute.

Text 9.

Molecule That Prevents Type 1 Diabetes in Mice Discovered; Has Similar Effect On Human Cells

ScienceDaily (Nov. 1, 2011) — Researchers at the University of Colorado School of Medicine have found a specific molecule that can prevent the development of type 1 diabetes in mice and has a similar effect on human cells from diabetic patients.

The findings, published in the latest edition of *The Journal of Immunology*, signal a new and promising direction in the fight against type I diabetes along with other autoimmune disorders like rheumatoid arthritis, multiple sclerosis and celiac disease.

Aaron Michels, MD, an assistant professor of pediatrics and medicine, working with George Eisenbarth., MD, Ph.D., executive director of the Barbara Davis Center for Childhood Diabetes at the CU School of Medicine, tested a series of molecules before finding one that stopped diabetes from developing in mice bred to get the disease.

"We found that when you put specific molecules into specific structural pockets you can block the formation of diabetes," said Eisenbarth. "We are basically throwing a monkey wrench into the machinery."

The researchers were looking for small molecules capable of occupying pockets along a protein binding groove.Some of the molecules got into these pockets and inhibited the presentation of insulin to immune cells while others enhanced it.

Type 1 diabetes is characterized by the body's inability to manufacture insulin because its own immune system is attacking it. The incidence of the disease has doubled in each of the last two decades.

Michels and Eisenbarth found that the compound Glyphosine enhanced insulin presentation and prevented diabetes in mice genetically modified to develop type 1diabetes. It had the same effect on human cells. The mice remained disease-free as long as they received daily injections of the compound. It was not as effective on mice that already had diabetes.

The molecules used in the research were obtained with the assistance of the University of Florida College of Medicine in Gainesville.

"Our role was to screen a large chemical library to identify drug candidates for prevention of type 1 diabetes," said David Ostrov, Ph.D., associate professor of pathology, immunology and laboratory medicine at the University of Florida. "We developed a novel screening method that pinpoints very specific areas of a protein that is genetically associated with type 1 diabetes."

Using a supercomputer, Ostrov's lab ran tests on 139,735 drug candidates to see which were most likely to bind on the four critical pockets of the protein.

"Not only does this provide a new way to change specific immune responses in a manner that is beneficial for diabetes, this shows that we may be able to modify specific immune responses for other autoimmune diseases," Ostrov said. "This is also relevant to cancer and infectious diseases where it would be beneficial to modify specific immune responses rather than in a general way."

Michels said that based on the two and a half year study, it would be feasible to genetically screen individuals likely to develop type 1 diabetes and begin a therapy regimen using

these compounds to prevent the onset of the disease. Right now, doctors can predict who will get type 1diabetes about 90 percent of the time.

"This technique would also apply to other autoimmune disorders like arthritis and celiac disease," Michels said. "The principals are the same."

The next step is to focus specifically on human cells to try and develop new therapies for clinical use. That could be at least five years away.

Text 10.

Natural Killer Cells Could Be Key to Anthrax Defense

ScienceDaily (Oct. 27, 2011) — One of the things that makes inhalational anthrax so worrisome for biodefense experts is how quickly a relatively small number of inhaled anthrax spores can turn into a lethal infection. By the time an anthrax victim realizes he or she has something worse than the flu and seeks treatment, it's often too late; even the most powerful antibiotics may be no help against the spreading bacteria and the potent toxins they generate.

Now, though, University of Texas Medical Branch at Galveston researchers have found new allies for the fight against anthrax. Known as natural killer cells, they're a part of the immune system normally associated with eliminating tumor cells and cells infected by viruses. But natural killer cells also attack bacteria -- including anthrax, according to the UTMB group.

"People become ill so suddenly from inhalational anthrax that there isn't time for a T cell response, the more traditional cellular immune response," said UTMB assistant professor Janice Endsley, lead author of a paper now online

in the journal *Infection and Immunity*. "NK cells can do a lot of the same things, and they can do them immediately."

In test-tube experiments, a collaborative team led by Endsley and Professor Johnny Peterson profiled the NK cell response to anthrax, documenting how NK cells successfully detected and killed cells that had been infected by anthrax, destroying the bacteria inside the cells along with them. Surprisingly, they found that NK cells were also able to detect and kill anthrax bacteria outside of human cells.

"Somehow these NK cells were able to recognize that there was something hostile there, and they actually caused the death of these bacteria," Endsley said.

In further experiments, the group compared the anthrax infection responses of normal mice and mice that were given a treatment to remove NK cells from the body. All the mice died with equal rapidity when given a large dose of anthrax spores, but the non-treated (NK cell-intact) mice had much lower levels of bacteria in their blood. "This is a significant finding," Endsley said. "Growth of bacteria in the bloodstream is an important part of the disease process."

The next step, according to Endsley, is to apply an existing NK cell-augmentation technique (many have already been developed for cancer research) to mice, in an attempt to see if the more numerous and active NK cells can protect them from anthrax. Even if the augmented NK cells don't provide enough protection by themselves, they could give a crucial boost in combination with antibiotic treatment.

"We may not be able to completely control something just by modulating the immune response," Endsley said. "But if we can complement antibiotic effects and improve the efficiency of antibiotics, that would be of value as well."

Text 11.

More Evidence That Allergies May Help in Fighting Brain Tumors

ScienceDaily (Oct. 20, 2011) — A study published online Oct. 18 in the *Journal of the National Cancer Institute* provides some new but qualified support for the idea that the immune system's response to allergies may reduce the risk of developing deadly brain tumors.

"These results suggest that there is something different about the immune response to tumor cells in people with allergies."People with somewhat elevated blood levels of immunoglobulin E (IgE), antibodies that carry out the body's immune response to allergens, were significantly less likely to develop gliomas, and those who did survived somewhat longer, than those with clinically normal IgE levels, according to the study by a team of researchers at Brown University and several other institutions in the United States and Europe.

"These results suggest that there is something different about the immune response to tumor cells in people with allergies," said corresponding author Dominique Michaud, associate professor of epidemiology in the Public Health Program at Brown University. "In terms of fighting the cancer or preventing it from growing, people who have allergies might be protected. They might be able to better to fight the cancer."

Questions answered, questions raised

The new study employed a methodology that addresses questions raised by previous studies that have also reported similar associations between IgE, or allergy symptoms, and brain tumors. Instead of asking people who have or have not been diagnosed with brain tumors to describe their allergy

history or to take IgE tests, the study delved into the detailed records of tens of thousands of people who participated in four broad-based health studies: the Physicians' Health Study, the Nurses' Health Study, the Women's Health Study, and the Health Professionals Follow-up Study.

Such "prospective" analysis of samples collected from patients before they were diagnosed or treated for brain tumors, allowed the researchers to measure the association between IgE and brain cancer risk without worry that the IgE levels were affected by the course of the disease and treatments for it.

"This is really the first study to look at total IgE levels collected prior to disease," Michaud said. "This is important in being able to determine whether this is a causal effect."

Although the pool of patients in the four studies was large, the actual number of relevant cases was small. Only 169 people with stored plasma subsequently developed brain tumors. They were matched with 520 control subjects (otherwise similar people who did not develop tumors). The small numbers blunted some of the study's results.

For example, the researchers found a statistically significant reduction in glioma risk among people with borderline elevated IgE levels (in a range of 25,000 to 100,000 units per liter), but not for people with even higher levels of IgE. Michaud acknowledged that further research would be needed to explain why the protective effect couldn't be measured in people with the highest IgE levels.

Ultimately, Michaud said, by strengthening the evidence that allergic immune response may affect brain tumors, the study may encourage cancer researchers to focus on the biological mechanisms underlying this association and provide insight into the disease and its treatment.

In addition to Brown, other institutions with affiliated authors of the paper include Imperial College in London,

Brigham and Women's Hospital in Boston, and the Harvard University School of Public Health in Boston.

Text 12.

For Patients With Both HIV and Tuberculosis the Timing of Drug Therapies Is Critical

ScienceDaily (Oct. 20, 2011) — In sub-Saharan Africa, tuberculosis is the disease that most often brings people with HIV into the clinic for treatment. Infection with both diseases is so common that in South Africa, for instance, 70% of tuberculosis patients are HIV positive. How best to treat these doubly infected patients-- who number around 700,000 globally-- is the subject of a new study, published in *The New England Journal of Medicine*, by scientists at Columbia University's Mailman School of Public Health and CAPRISA (Centre for the AIDS Programme of Research in South Africa).

The authors had previously shown that integrating antiretroviral therapy (ART) concurrently with tuberculosis treatment reduces mortality among these patients and is preferable to treating the diseases sequentially. The new study investigates the best timing for introducing treatment for HIV. The researchers find that the optimal time for antiretroviral treatment depends on the patient's immune status. Patients with very low T-cell counts, a measure of how well the immune system is working, appear to do better with an earlier integration of treatment for HIV.

Full study findings are available online in the October 20 issue of *New England Journal of Medicine*.

The SAPIT (Starting Antiretroviral Therapy at Three Points in Tuberculosis) study is the first randomized, controlled trial to examine the timing of the dual therapy. Conducted in

South Africa, the study involved 642 patients, all with confirmed tuberculosis (TB) and HIV infection. The current paper look at results for 429 patients, half of whom were randomly assigned to begin treatment for HIV within the first four weeks of starting drug therapy for tuberculosis and half of whom were assigned to later treatment -- about 3 months after beginning the TB drugs. (A third arm of the study, with 213 patients treated for HIV only after their TB treatment was complete, was discontinued when it became clear that waiting to start ART till after completing TB treatment brought poorer results.)

Overall, the rates of AIDS or death were similar for the TB patients who received early ART and those who received later ART during TB treatment. However, the findings in severely immune-compromised patients differed substantially. Among patients with CD4+ T-cell counts of less than 50 per cubic millimeter (advanced HIV disease), starting anti-retroviral therapy earlier was associated with a rate of AIDS or death that was about two-thirds lower than for those with a later start.

"We found that recommendations by the World Health Organization (WHO) to start ART as soon as possible after initiating of tuberculosis treatment for patients with very low T-cell counts were in line with our findings," noted Salim Abdool-Karim, MD, a professor of epidemiology at the Mailman School and director of CAPRISA. "However, the results for patients with tuberculosis and HIV who have a higher T-cell count call for a different approach." In light of this evidence, he said, "WHO recommendations may need to be revisited."

All patients in the study received a standard tuberculosis treatment regimen that began with an "intensive" phase of four drugs: rifampin, isoniazid, ethambutol, and pyrazinamide, followed by a four-month "continuing" phase

of treatment with just two drugs -- isoniazid and rifampmicin. Patients in the early-ART group (214 individuals) began retroviral drug treatment during the intensive phase, at a median of 21 days after beginning TB therapy. The later-ART group (215 patients) began retroviral therapy during the continuing phrase, at a median of 97 days.

While starting ART earlier was of great benefit for patient with advanced HIV disease, waiting until after three months of TB treatment to start ART may be an appropriate option for those with less advanced HIV disease, as indicated by higher T-cell counts.

"In fact, we found that the later initiation of ART actually cut the risk of an adverse reaction called IRIS (immune reconstitution inflammatory syndrome) by about half and lowered significantly the need to switch antiretroviral drugs because of side effects," noted Dr. Karim. However, waiting longer to start ART until after TB treatment is completed would be a mistake, he observes, especially in light of earlier findings that such delay was associated with 56% higher mortality.

"Starting antiretroviral therapy during TB treatment saves lives," observes Wafaa El-Sadr, MD, professor of epidemiology at the Mailman School, director of ICAP, and a co-author of the paper. "The evidence is in and we now must take the findings to scale."

The researchers report no significant differences between the earlier-ART and later-ART groups in the outcomes of tuberculosis treatment.

Chemistry

[Кутепова М.М. The World of Chemistry: Английский язык для химиков. – М.: КДУ, 2006**].**

Text 1.

By 1000 BC, ancient civilizations used technologies that would eventually form the basis of the various branches of chemistry. Examples include extracting metals from ores, making pottery and glazes, fermenting beer and wine, making pigments for cosmetics and painting, extracting chemicals from plants for medicine and perfume, making cheese, dying cloth, tanning leather, rendering fat into soap, making glass and making alloys like bronze.

Early attempts to explain the nature of matter and its transformations failed. The protoscience of chemistry, Alchemy, was also unsuccessful in explaining the nature of matter. However, by performing experiments and recording the results the alchemist set the stage for modern chemistry. This distinction begins to emerge when a clear differentiation was made between chemistry and alchemy by Robert Boyle in his work The Sceptical Chymist (1661). Chemistry then becomes a full-fledged science when Antoine Lavoisier develops his law of conservation of mass, which demands careful measurements and quantitative observations of chemical phenomena. So, while both alchemy and chemistry are concerned with the nature of matter and its transformations, it is only the chemists who apply the scientific method. The history of chemistry is intertwined with the history of thermodynamics, especially through the work of Willard Gibbs.

Text 2. The philosopher's stone and the rise of alchemy

Many people were interested in finding a method that could convert cheaper metals into gold. The material that would help them to do this was rumored to exist in what was called the philosopher's stone. This led to the protoscience called alchemy. Alchemy was practiced by many cultures throughout history and often contained a mixture of philosophy, mysticism, and protoscience.

Alchemy not only sought to turn base metals into gold, but especially in a Europe rocked by bubonic plague, there was hope that alchemy would lead to development of medicines to improve people's health. The holy grail of this strain of alchemy was in the attempts made at finding the elixir of life, which promised eternal youth. Neither the elixir nor the philosopher's stone were ever found. Also, characteristic of alchemists was the belief that there was in the air an "ether" which breathed life into living things. Practitioners of alchemy included Isaac Newton, who remained one throughout his life.

Text 3. Problems encountered with alchemy

There were several problems with alchemy, as seen from today's standpoint. There was no systematic naming system for new compounds, and the language was esoteric and vague to the point that the terminologies meant different things to different people. In fact, according to The Fontana History of Chemistry (Brock, 1992):

The language of alchemy soon developed an arcane and secretive technical vocabulary designed to conceal information from the uninitiated. To a large degree, this language is incomprehensible to us today, though it is apparent that readers of Geoffery Chaucer's Canon's Yeoman's Tale or audiences of Ben Johnson's The Alchemist were able to construe it sufficiently to laugh at it.

Chaucer's tale exposed the more fraudulent side of alchemy, especially the manufacture of counterfeit gold from cheap substances. Less than a century earlier, Dante Alighieri also demonstrated an awareness of this fraudulence, causing him to consign all alchemists to the Inferno in his writings. Soon after, in 1317, the Avignon Pope John XXII ordered all alchemists to leave France for making counterfeit money. A law was passed in England in 1403 which made the "multiplication of metals" punishable by death. Despite these and other apparently extreme measures, alchemy did not die. Royalty and privileged classes still sought to discover the philosopher's stone and the elixir of life for themselves.

There was also no agreed-upon scientific method for making experiments reproducible. Indeed many alchemists included in their methods irrelevant information such as the timing of the tides or the phases of the moon. The esoteric nature and codified vocabulary of alchemy appeared to be more useful in concealing the fact that they could not be sure of very much at all. As early as the 14th century, cracks seemed to grow in the facade of alchemy; and people became sceptical. Clearly, there needed to be a scientific method where experiments can be repeated by other people, and results needed to be reported in a clear language that laid out both what is known and unknown.

Text 4. Early chemists

In the Arab World, the Muslims were translating the works of the ancient Greeks and Egyptians into Arabic and were experimenting with scientific ideas. The development of the modern scientific method was slow and arduous, but an early scientific method for chemistry began emerging among early Muslim chemists, beginning with the 9th century chemist Jābir ibn Hayyān (known as "Geber" in

Europe), who is "considered as the father of chemistry". He introduced a systematic and experimental approach to scientific research based in the laboratory, in contrast to the ancient Greek and Egyptian alchemists whose works were largely allegorical and often unintelligible. He also invented and named the alembic (al-anbiq), chemically analyzed many chemical substances, composed lapidaries, distinguished between alkalis and acid, and manufactured hundreds of drugs. He also refined the theory of five classical elements into the theory of seven alchemical elements after identifying mercury and sulfur as chemical elements.

Among other influential Muslim chemists, Ja'far al-Sadiq, Alkindus, Abū al-Rayhān al-Bīrūnī, Avicenna and Ibn Khaldun refuted the theories of alchemy, particularly the theory of the transmutation of metals; and al-Tusidescribed a version of the conservation of mass, noting that a body of matter is able to change but is not able to disappear. Rhazes refuted Aristotle's theory of four classical elements for the first time and set up the firm foundations of modern chemistry, using the laboratory in the modern sense, designing and describing more than twenty instruments, many part of which are still in use today, such as a crucible, decensory, cucurbit or retort for distillation, and the head of a still with a delivery tube (ambiq, Latin alembic), and various types of furnace or stove.

Text 5. The modern definition of chemistry.

Classically, before the 20th century, chemistry was defined as the science of the nature of matter and its transformations. It was therefore clearly distinct from physics which was not concerned with such dramatic transformation of matter. Moreover, in contrast to physics, chemistry was not using much of mathematics. Even some

were particularly reluctant to using mathematics within chemistry.

After the discovery by Ernest Rutherford and Niels Bohr of the atomic structure in 1912, and by Marie and Pierre Curie of radioactivity, scientists had to change their viewpoint of the nature of matter. The experience acquired by chemists was no longer pertinent to the study of the whole nature of matter but only to aspects related to the electron cloud surrounding the atomic nuclei and the movement of the latter in the electric field induced by the former (see Born-Oppenheimer approximation). The range of chemistry was thus restricted to the nature of matter around us in conditions which are not too far (or exceptionally far) from standard conditions for temperature and pressure and in cases where the exposure to radiation is not too different from the natural microwave, visible or UV radiations on Earth. Chemistry was therefore redefined as the science of matter that deals with the composition, structure, and properties of substances and with the transformations that they undergo. However the meaning of matter used here relates explicitly to substances made of atoms and molecules, disregarding the matter within the atomic nuclei and its nuclear reaction or matter within highly ionized plasmas. This does not mean that chemistry is never involved with plasma or nuclear sciences or even bosonic fields nowadays, since areas such as Quantum Chemistry and Nuclear Chemistry are currently well developed and formally recognized sub-fields of study under the Chemical sciences (Chemistry), but what is now formally recognized as subject of study under the Chemistry category as a science is always based on the use of concepts that describe or explain phenomena either from matter or to matter in the atomic or molecular scale, including the study of the behavior of many molecules as an aggregate or the

study of the effects of a single proton on a single atom, but excluding phenomena that deal with different (more "exotic") types of matter (e.g. Bose-Einstein condensate, Higgs Boson, dark matter, naked singularity, etc.) and excluding principles that refer to intrinsic abstract laws of nature in which their concepts can be formulated completely without a precise formal molecular or atomic paradigmatic view (e.g. Quantum Chromodynamics, Quantum Electrodynamics, String Theory, parts of Cosmology (see Cosmochemistry), certain areas of Nuclear Physics (see Nuclear Chemistry), etc.). Nevertheless the field of chemistry is still, on our human scale, very broad and the claim that chemistry is everywhere is accurate.

Text 6. The origin of coal

Carbon compounds are very abundant in nature. All organic substances are carbon compounds, and dead animals or plant matter, once exposed to the air, decay very rapidly owing to the oxidation brought about by the agency of bacteria. The gaseous products of this process of decay escape in bacterial decomposition, and become trapped or fixed in rock. Coal and petroleum are supposed to be the result of this failure of nature's cleaning system.

When plant matter from the great prehistoric forests came submerged in swamps and bogs, the supply of air was limited, and complete oxidation was, therefore, impossible.

These beds of dead plant matter gradually became covered with deposits of sand and mud, so that the pressure above them became very great, the beds of plant tissue being pushed deeper into the hotter zones of the Earth's crust. As a result of this terrific compression, water is believed to have been pressed out of the plant remains and the chemical changes taking place resulted in the loss of

hydrogen and hydrogen compounds such as methane (marsh gas).

The final result, after thousands of years, was coal: a material containing a high percentage of carbon. Different varieties of coal, dependent on the pressure involved, may be formed. The process of coal formation is generally believed as follows:

plant matter → peat (29%C) → lignite (43%C) → bituminous coal (64%C) → anthracite (87%C).

The percentages of carbon given above are average values from the analysis of a large number of coals, but the gradual increase in carbon content is clearly shown. If the pressure of the rock has been so great that all the hydrogen has been expelled, graphite is formed. Coal is not found, therefore, in the oldest rocks since the pressures involved would have expelled (удалили бы) all hydrogen from the original plant tissue. The theory of the biological origin of the coal may be represented by the following diagram:

atmospheric carbon dioxide → photosynthesis → sugar → starch → cellulose → (plant tissue) → wood → coal.

Thus, the solar energy stored by plants during the process of photosynthesis millions of years ago is liberated as heat energy in the combustion of coal today.

Text 7. Mercury in the environment

Mercury is known to be a rare metal. The elements is found in trace amounts throughout the lithosphere (rocks and soil), the hydrosphere, the atmosphere and the biosphere (in tissue of plants and animals). In the rocks and soil mercury is found to be measured in fractions of one part per million. In the hydrosphere (the seas and fresh water) it occurs only in parts per million. In the atmosphere mercury is present both as vapour and in the form of particles. It

should be noted, however, that under natural conditions the amount of mercury in the atmosphere is so small that extremely sensitive methods are required for detecting and measuring it. The situation is somewhat different in the biosphere. Plants and animals tend to concentrate mercury. For example, it has been found that some marine algae contain a concentration of mercury more than 100 times higher than that in the seawater in which they live. Mercury today is used on a substantial scale in chemical industries, it being used in the manufacture of paints and paper as well as in agriculture. The world production of mercury has been found to amount to about 10,000 tons per year. In agriculture mercury in the form of corrosive sublimates ($HgCl_2$) can be used for disinfecting seeds. The chlorides of mercury are employed in protecting a number of vegetable crops. Due to such large-scale uses a considerable amount of mercury wastes is likely to flow into the air, the soil, the streams, rivers, lakes. One might ask whether all these may present a threat to health? In order to answer this question it is necessary to examine the forms in which mercury occurs. Liquid mercury itself is not toxic to man, but mercury vapour, however, can be injurious. It has long been known that the soluble inorganic salts are toxic. So, knowing properties and forms of mercury, it is possible to use it. Mercury being very important, it is useful to continue investigating its properties very closely.

Text 8. Plastics

Plastics are organic substances made synthetically by polymerization, and capable of being formed into an almost endless variety of products, e.g. threads, sheets, tubes, and moulded objects. The ancestor of modern synthetic plastics is celluloid. Celluloid has certain disadvantages – its flammability and the fact that it is not readily moulded.

Thus it was not until the discovery of bakelite in 1907 that the real foundation of synthetic plastics industry was laid.

Plastics that consist of long-chain molecules can be softened by heat and moulded into a desired shape. These plastics are called thermoplastic. Plastics in which the polymer chains are cross-linked have much greater rigidity and cannot be softened readily. They are called thermosetting. The terms “thermoplastic” and “thermosetting” are also applied to the resins from which plastics are made.

The principal agent incorporated in a plastic is the resin; it may be natural, like cellulose, but it is most generally synthetic.

The resin is also known as the binder. Substances added to the plastic to enhance certain properties, e.g. hardness, resistance to shock, or resistance to abrasion, are called fillers; examples are asbestos, glass fibres, and wood flour.

Plasticizers are also included in the formation. Antioxidants may be added to promote chemical stability and thus prolong life. Catalysts are added to assist the final cure (final formation of the product), the stabilizers to protect against sunlight, heat, and other destructive factors.

The procedure used to shape a plastic into its final form depends on the properties of the plastic. Some plastics can be injection moulded. Other plastics must be compression moulded; after they are filled into the mould they are subjected to pressure. Certain plastics are simply cast into their final shape.

Geography

Text 1.

Andrew Fazekas
for National Geographic News
Published August 12, 2011

It may be hard to imagine a planet blacker than coal, but that's what astronomers say they've discovered in our home galaxy with NASA's Kepler space telescope.

Orbiting only about three million miles out from its star, the Jupiter-size gas giant planet, dubbed TrES-2b, is heated to 1,800 degrees Fahrenheit (980 degrees Celsius). Yet the apparently inky world appears to reflect almost none of the starlight that shines on it, according to a new study.

"Being less reflective than coal or even the blackest acrylic paint—this makes it by far the darkest planet ever discovered," lead study author David Kipping said.

"If we could see it up close it would look like a near-black ball of gas, with a slight glowing red tinge to it—a true exotic amongst exoplanets," added Kipping, an astronomer at the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts.

NASA's Planet Detector

The **Earth**-orbiting Kepler spacecraft was specifically designed to find planets outside our **solar system**. But at such distances—TrES-2b, for instance, is 750 light-years from us—it's not as simple as snapping pictures of alien worlds.

Instead, Kepler—using light sensors called photometers that continuously monitor tens of thousands of stars—looks for the regular dimming of stars.

Such dips in stellar brightness may indicate that a planet is transiting, or passing in front of a star, relative to Earth,

blocking some of the star's light—in the case of the coal-black planet, blocking surprisingly little of that light.

Black Planet Spurs Dimmest of Dimming

When a planet passes in front of its star, the world's shaded side faces Kepler. But as the planet begins orbiting to the side of and "behind" its star, its star-facing side comes to face the viewer. The amount of starlight grows until the planet, becoming invisible to Kepler, passes fully in back of its star.

Watching TrES-2b and its star, Kepler detected only the slightest such dimming and brightening, though enough to ascertain that a Jupiter-size gas giant was the cause.

The light reflected by the newfound extrasolar planet, or exoplanet, changed by only about 6.5 parts per million, relative to the brightness of the host star.

"This represents the smallest photometric signal we have ever detected from an exoplanet," Kipping said.

What's more, as the coal-black planet passed in front of its star, the starlight's dimming was "so small that it's like the dip in brightness we would see with a fruit fly going in front of a car headlight."

The Dark Mystery of TrES-2b

Current computer models predict that hot-Jupiter planets—gas giants that orbit very close to their stars—could be only as dark as Mercury, which reflects about 10 percent of the sunlight that hits it.

But TrES-2b is so dark that it reflects only one percent of the starlight that strikes it, suggesting that the current models may need tweaking, Kipping said.

Assuming the new study's measurements are sound, what exactly is making the new planet's atmosphere so dark?

"Some have proposed that this darkness may be caused by a huge abundance of gaseous sodium and titanium oxide,"

Kipping said. "But more likely there is something exotic there that we have not thought of before.
"It's this mystery that I find so exciting about this discovery."
TrES-2b may even represent a whole new class of exoplanet—a possibility Kipping and company hope to put to the test with Kepler, which has so far detected hundreds of planets outside our solar system.
"As Kepler discovers more and more planets by the day, we can hopefully scan through those and work out if this is unique or if all hot Jupiters are very dark," Kipping said.
Meanwhile, the very darkness of the new exoplanet suggests perhaps a catchier moniker for TrES-2b, Kipping said. "Maybe an appropriate nickname would be Erebus"—ancient Greece's god of darkness.
The coal-black planet study has been accepted for publication in the Monthly Notices of the Royal Astronomical Society.

Text 2.

Trading Oil for Natural Gas in the Truck Lane
Josie Garthwaite
For National Geographic News
Published September 2, 2011
Why would a company buy thousands of trucks and vans fresh off the assembly line and install a bulky and expensive new fuel system? It comes down to the bottom line.
In a time when natural gas is relatively cheap, but manufacturers build mostly gasoline and diesel models, companies like AT&T and Verizon have calculated it's

worth the expense to convert some gasoline vehicles to burn compressed natural gas (CNG).

Worldwide, natural gas vehicles make up a tiny sliver of the auto pie, accounting for just under one percent of all vehicles, according to 2010 data published by the trade association NGV Global. But in some parts of the world they're gaining popularity. AT&T announced last month that natural gas vehicles in its fleet now number 3,000, out of a total of more than 73,500 vehicles. By 2013, the company plans to increase the number of natural gas vehicles to 8,000.

And AT&T isn't alone. Between 2010 and 2016, the market research firm Pike Research predicts, global natural gas vehicle sales will grow by more than 9 percent year over year. Even some of the largest trucks on the road, such as long-haul UPS trucks, have been built to run on liquefied natural gas (LNG), rather than expensive diesel. And according to Rich Kolodziej, president of the trade association Natural Gas Vehicles for America, a number of companies are close to certifying conversion systems that would power big rigs using about half natural gas and half diesel fuel.

Today, most of the world's natural gas vehicles are found in Pakistan, Iran, Argentina, Brazil, and India (each country has more than one million natural gas vehicles, according to NGV Global). In Egypt, for example, virtually every taxi runs on natural gas. Conversions have been available there at no upfront cost, said Kolodziej. Instead, government and banks have subsidized the retrofits, which drivers then pay for over time through a small fee at the pump. Using computer chips and a central database, he said, the fuel nozzle recognizes cars that have received the "free" conversion.

Yet it's in the United States where Pike Research expects to see the most growth in coming years, due to the possibility of new incentives and emissions regulations. Even barring new incentives, Pike Research senior analyst Dave Hurst said he anticipates strong growth. "The cost of natural gas is expected to remain significantly lower than diesel and gasoline," he wrote in an email, "and emissions restrictions will add to the cost of diesel trucks in the medium- and heavy-duty market, which will help in the payback of natural gas trucks."

While some state and federal incentives are already available, only 0.15 percent of natural gas consumed in the U.S. goes toward fueling vehicles, according to an MIT study published earlier this year. Most of it is used for industrial boilers and residential space heating.

According to Jigar Shah, chief executive of the Carbon War Room, which researches and implements entrepreneurial solutions to climate change, the U.S. is behind the curve in transitioning to natural gas vehicles. In an interview, he blamed regulatory hurdles for adding to retrofit costs. "Here, you can be thrown in jail for tampering with your engine," he said.

Well, not quite. But the U.S. Environmental Protection Agency and state agencies do regulate vehicle emissions and certify the vehicles and engines produced by automakers. Removing or disabling part of a certified vehicle or engine can be considered tampering-a violation punished with hefty fines. "EPA has to certify that your conversion system doesn't make the vehicle dirtier," said Kolodziej. California's standards (also adopted by other states) are even more strict and complex, he added, and in total these certifications can cost the retrofit provider $50,000 to $100,000.

Fleet operators also have to make sure a retrofit won't mean sacrificing the original manufacturer's warranty. For example, BAF Technologies' EPA-certified CalComp system, which converts Ford pick-up trucks and vans to run on CNG or a combination of CNG and gasoline, is also sanctioned by Ford, thus preserving the warranty.

Pay Now, Save Later

"Theoretically, it shouldn't be expensive" to convert vehicles to run on natural gas, said Kolodziej. In many countries, he said, it's common for natural gas vehicles to simply use a three-gallon steel tank-even if it means refueling every 70 miles or so because CNG requires more storage space than gasoline. "Americans don't want to be inconvenienced." They demand more range, which means larger tanks, which in turn are made from carbon-wrapped composite materials. These tanks are lighter weight, but also more expensive, he explained, so storage accounts for about half the cost of a conversion.

For its part, AT&T expects to spend $350 million on its 8,000 converted CNG vehicles. That works out to nearly $44,000 per vehicle, compared to retail prices starting around $25,000 to $30,000 for gasoline versions (though no doubt AT&T would enjoy a bulk discount). Supported by Recovery Act funding, UPS reportedly bought 48 factory-built LNG trucks this year for about $200,000 apiece, or twice the price of a comparable diesel big rig.

And there's often an additional investment for fueling infrastructure. At this point, given the limited availability of natural gas filling stations, Kolodziej said natural gas is most compelling for fleets with "return to home" or "point to point" vehicles-vans, trucks, and buses that run predictable routes and come back to a central location, where "one station fills them all," or vehicles that travel between two depots equipped with filling stations.

The United States has about 180,000 gasoline stations, he said, compared to about 1,000 CNG stations (about half of those are open to the public). To transition to another fuel, he asked, "How do you begin? Start installing stations that you know will be profitable." One aspect of this is calculating how quickly vehicles must be refueled. A fleet of school buses that has all night to refuel, for example, can afford a smaller compressor. But a public station designed to meet the needs of an unlimited number of light-duty vehicles on demand would need a much larger, more costly compressor.

It's a different story if the main goal is to grow the market for natural gas vehicles, Kolodziej said. Germany, for example, has built a public network of about 950 natural gas filling stations in recent years with an approach that Kolodziej described as "if you build it, they will come."

Costs aside, AT&T and others are betting that natural gas vehicles will earn their keep by saving money on fuel in the long run. Last year trucks and vans fueled by CNG saved AT&T the equivalent of one million gallons of petroleum, the company says.

"The more you drive, the faster you save money," Kolodziej said. Take for example a cargo van that travels, say, 25,000 miles per year and gets 17 miles per gallon. That adds up to nearly 1,500 gallons annually. With CNG, fuel costs can drop by about $1.50 per gallon-equivalent compared to gasoline (for 2012 fuel cost calculations, the EPA assumes $3.63 per gallon regular gasoline, $3.82 for diesel and $2.07 per gallon CNG). Multiplied by 1,500 gallons per year, that amounts to about $2,200 in annual fuel savings.

The savings add up faster in cases where the vehicle travels more miles and has lower fuel economy (or, Kolodziej noted, if the fleet operator fills up at a private station where CNG is cheaper). Depending on these factors, a natural gas

vehicle can pay back the cost in three to seven years. Fleet operators and drivers can see even quicker returns in places where there's a larger gap between natural gas and gasoline or diesel prices, often subsidized by government.

Natural gas vehicles also help companies reduce their tailpipe emissions, but not by enough to meet long-term climate goals, said Shah. "Natural gas is a great choice for finally doing something about oil, but most likely not the ultimate winner in 2050," given the imperative to make more drastic emission cuts, he explained in an email. The European Commission's Transport 2050 strategy, for example, calls for cutting carbon emissions from the transport sector by 60 percent by mid-century.

According to California state government figures cited by NGVAmerica, as a fuel for heavy-duty vehicles, compressed natural gas has carbon intensity only 20 percent lower than gasoline.

Power Plants vs. Vehicles

Natural gas has generated buzz as an alternative to coal for generating electricity amid the development of controversial hydraulic fracturing ("fracking") techniques for extracting natural gas. But according to Shah, "If natural gas is promoted for anything, it should be for transportation." He explained, "Natural gas combined-cycle power plants are quite cheap to build. The big cost is the fuel." If the price of natural gas in the field were to double, for example, customers would likely see comparable spikes on their electric bills, he said.

In transportation fuels, on the other hand, the price of natural gas in the field makes up a fraction of the price at the pump (according to Kolodziej, it's about one-third). The remainder comes chiefly from transporting the natural gas, as well as compressing it, taxes, and a markup for profit.

Being less vulnerable to the price of fuel in the field is especially important when it comes to natural gas, said Shah, because its price is "notoriously unreliable."
However, "We don't need to be addicting ourselves to another fossil fuel," said Shah. He sees natural gas as a temporary and partial solution for transportation. "It's not a permanent call," he said. A power plant built to burn natural gas can be expected to generate electricity for 40 to 50 years, he said. With vehicles, "you're only making that decision for 20 years. Trucks don't last forever."

Text 3.

Largest U.S. Dam Removal to Restore Salmon Runs
The Pacific Northwest's Elwha River to teem with life again, experts say.
Ker Than
for National Geographic News
Published August 31, 2011
This story is part of a special National Geographic News series on global water issues.
In Washington State's Olympic Peninsula, members of the Lower Elwha Klallam Tribe still tell stories of a time when the Elwha River was so full of salmon that a person could cross from one bank to the other by walking atop the thrashing bodies of fish struggling to move upstream.
No one has attempted such a feat since two dams were built, near the mouth of the river, in the early 20th century, blocking salmon runs.
But on September 15, officials in Olympic National Park will begin the long process of dismantling the Elwha and Glines Canyon dams on the Elwha River. (See a map of the region.)

The largest dam-removal undertaking in U.S. history, the project could serve as an inspiration and a model for similar enterprises in other parts of the country, conservationists say.

"Close to a thousand dams have been removed across our country, but these are the biggest," said Amy Kober, a spokesperson for the environmental group American Rivers. "It is one of the most significant restoration efforts we have ever seen."

(Learn about threats to fresh water and tips on water conservation.)

Dams No Longer Needed on Elwha

Completed in 1913, the 108-foot (33-meter) high Elwha Dam is situated about 4 miles (6.43 kilometers) from the mouth of the Elwha River. About 10 miles (16 kilometers) farther upriver sits the 210-foot-high (64-meter-high) Glines Canyon Dam, which was completed in 1927. (See more dam pictures.)

Both dams, constructed to provide electricity for a paper mill in the city of Port Angeles, were built without fish ladders, which allow salmon to navigate through dams.

The dams played an important role in the early development of the Olympic Peninsula at the turn of the last century but today are obsolete, because most of the region's power is now imported via an electric grid from Portland, Oregon.

The dams' removal had been proposed as far back as the 1970s, but was resisted by many of the local communities. Finally, a U.S. congressional act passed in 1992 paved the way for the U.S. government to acquire the dams and remove them in order to restore the river's ecosystem.

According to Kober, much of the initial resistance to the dams' removal was due to a fear of change. For many of the residents of Olympic Peninsula, the artificial lakes created by the dams' reservoirs were a natural part of the landscape,

and their disappearance would be jarring. No homes or buildings would be threatened by the restored flow of the river.

But "over the years, people came to realize that the benefits of removing the dams far outweighed any benefits of keeping them," Kober said.

Despite the government's support, nearly another decade would pass before the dams' deconstruction could begin. The barrier this time was cost, according to David Graves, Northwest program manager for the Washington, D.C.-based National Parks Conservation Association (NPCA).

"The final cost was estimated to be 351 million dollars, and it took many years to get that money together," he said.

Also, the 1992 act called for 43 projects to be completed before the dam dismantling process could start. These projects were designed to prepare the river and the region for the effects of the dams' removal.

For example, new water-treatment plants had to be constructed to deal with the predicted rise in river sediments, and levies had to be improved to protect private property along certain sections of the river where the water level was expected to rise.

Those safeguards now in place, engineers can finally begin slowly removing sections of the dams next month in a process that is expected to take about three years. The draining of the dams' reservoirs began earlier this summer.

The lumber mill that relies on the dam for power will begin looking for ways to generate power on site, Kober said.

Dam Removal Will Restore "Web of Life"

The razing of the dams will allow the Elwha's waters to once again flow free, and experts predict that the river's salmon populations will swell from their current number of about 3,000 to nearly 400,000.

(Related: "Will Dam Removal in the West Restore Salmon?")

The salmon—which include pink, chinook, coho, chum, sockeye, and other species—will once more have access to the more than 70 miles (113 kilometers) of waterways that make up the Elwha River and its tributaries. Currently, the fish can swim only a few miles upriver before the Elwha Dam blocks their passage.

Biologists say the return of the fish will benefit more than 130 species of plants and animals that have been deprived of a vital food and nutrient source for nearly a century.

"Everything from black bears to tiny insects and even orca whales will benefit. The salmon even fertilize the cedar trees along the river" after they die, Kober said.

"We're not just restoring the salmon—we're knitting back together the web of life, from the salt water of Puget Sound all the way up to the Olympic Mountains. There are going to be chain reactions throughout the whole ecosystem once the salmon start coming back."

Already changes to the river are apparent with the draining of the reservoirs, Kober noted.

"It's really starting to come back to life," she said. "We're already seeing it reclaim its old channels and its old shapes. ... As the water starts flowing again, we'll see new rapids being revealed."

Once the dams are gone, tons of trapped sediment and driftwood will also be free to flow downstream again.

"When a river is operating normally, sediment is washed downstream and out to sea, providing material for the shoreline," NPCA's Graves said.

"But for the past hundred years, all that sediment has been locked up behind the dams."

The discharged sediment could also benefit humans by forming a natural barrier against ocean waves at the mouth of the Elwha.

"Surfers are excited about how the new sand will improve the surf break near the river's mouth," American Rivers' Kober said.

Dam Removal May Inspire More Restoration

The lessons learned during the Elwha dams' removal will be valuable for future dam-removal projects, said NPCA's Graves.

"Scientists can look to these dam removals and see how easy or how hard it is to restore a river," Graves said.

"They can look at this and see what sort of projects need to happen beforehand, and once the dams are down how many years it takes for a river to return to its historic state."

American Rivers' Kober predicts the Elwha dams' removal will also inspire other restoration projects across the country.

"People are going to look at the Elwha and see it returning to health, and they're going to start asking questions about their own rivers," she said.

Salmon to Easily Return to River?

Biologists do not think the salmon will have any problems recolonizing their ancestral breeding grounds.

"They're programmed to do this," said Michael McHenry, a fisheries biologist for the Lower Elwha Klallam Tribe.

"Salmon have dealt with large scale disturbances across the Pacific Northwest landscape for millions of years. They've dealt with glaciation, volcanic eruptions, and huge landslides that probably temporarily eliminated them from parts of their range."

In comparison, the dams, which have been around for only a century, are "a blink in geologic time," McHenry said, and

should not pose any major challenges for the returning salmon.
But whether the fish will return in strong enough numbers to allow for salmon walks across the river once again remains to be seen, especially with other pressures on the fish, such as overfishing.
"I guess I'm not a person who thinks we can turn back the clock to the 18th century."

Text 4.

First New U.S. Bird Species in Decades—Already Extinct?
Hawaiian seabird confirmed as new species from single preserved specimen.
Christine Dell'Amore
National Geographic News
Published August 30, 2011
A new bird species has been discovered in the U.S. for the first time in nearly 30 years—but the species may have already flown the coop for good, a new study says.
Scientists in Washington, D.C., identified the tiny seabird, dubbed Bryan's shearwater (Puffinus bryani), from a single specimen collected in 1963 at Midway Atoll (map) in the Northwestern Hawaiian Islands.
Though the bird had been thought to be a new species, it took a recent DNA analysis to confirm that fact.
P. bryani—named for Edwin Horace Bryan, Jr., late curator of the Bishop Museum in Honolulu—is the first bird species named in the United States since the 1974 discovery of the po'ouli, found on the Hawaiian island of Maui.
Not only is Bryan's shearwater the smallest of about 21 shearwater species, it also has a longer, blacker tail than

related birds, according to study co-author Rob Fleischer, head of the Smithsonian Conservation Biology Institute's Center for Conservation and Evolutionary Genetics in Washington, D.C.

"Most people looking at it ... say they all look the same," Fleischer said. "But to someone who's trained to see these differences, they're striking."

New Bird Species Already Extinct?

With only one specimen in existence—another P. bryani was captured temporarily and photographed in 1990—scientists know very little about the black-and-white seabird.

The Midway Atoll and nearby islands have been extensively surveyed for seabirds, so it's unlikely a healthy P. bryani population would have gone unnoticed, Fleischer noted. Considering this, the bird could be extremely rare or even extinct.

Even so, "seabirds have a habit of hiding—they're long-lived, so they can be out at sea for a long time," he said.

What's more, Fleischer and colleagues suspect P. bryani, if it still exists, likely breeds in Japan or elsewhere in the Pacific and is only a temporary resident of the Hawaiian Islands. Scientists often gather information about birds by researching their breeding colonies.

"It's always nice to add new species to put on the list," Fleischer said, though "you now have a new species to be concerned about that appears to be very rare."

It's not a good thing, he added, "when we can't even find the bird to manage it."

New bird species study appeared in August in the journal Condor.

Text 5.

Why Irene Was More Dangerous Than It Should Have Been

Storm dodged bullet, grew bigger, lasted longer, meteorologists say.

Willie Drye in Plymouth, North Carolina
for National Geographic News
Published August 29, 2011

So far Hurricane Irene's estimated damage isn't as bad as had been feared, but the storm was actually much more destructive than it had any right to be, experts say.

Despite diminishing wind speeds, Irene accumulated a rare combination of meteorological lucky breaks that allowed the storm to swell surprisingly wide and last longer than expected, resulting in an unexpectedly vast and long trail of destruction.

As Hurricane Irene passed over the Bahamas late last week, it encountered low atmospheric, or barometric, pressure, which causes air to rise — in this case, warm and moist air, the lifeblood of hurricanes.

Over the islands, Irene's peak winds reached 115 miles (185 kilometers), making it a Category 3 hurricane.

Forecasters last week had feared Irene would maintain those very high winds when it hit the U.S. mainland at North Carolina over the weekend.

But as the storm approached the state, Irene encountered a mass of dry, hurricane-squelching air coming off the coast. Irene soon slowed to Category 1 speeds, making landfall with winds of about 85 miles (137 kilometres) an hour.

But the dry air also diffused Irene so that, though its winds had slowed, it affected a much wider area.

"It affected a lot more people than would have been the case if it had been a smaller storm," said Keith Blackwell of the

University of South Alabama's Coastal Weather Research Center.

At the same time, the storm was dodging a bullet.

The jet stream—a fluctuating, narrow current of powerful upper-level winds—could easily have weakened or destroyed Irene by scattering her swirling winds, as often happens when the stream meets a storm.

Instead, "the jet stream kept sufficient distance from the storm so that it did not shear it but was close enough so that the northward flow of the jet stream—which was the same direction of the path of the storm—greatly aided the hurricane to maintain its unusually low pressure for a Category 1 storm," Blackwell said.

"Sometimes the jet stream destroys a hurricane, sometimes it enhances it," said Blackwell, noting meteorologists are still decoding how the structure of a hurricane can fluctuate.

Irene Out of Luck?

Hurricanes usually weaken significantly as they pass over land, because their momentum is disrupted and their barometric pressure rises, decreasing the turbulent winds.

By continuing to attract warm, moist air, Irene's strangely low pressure kept the hurricane's engine running, allowing the storm to continue up the East Coast, despite the storm being relatively diffused and slowed.

By the time the storm reached New York City Sunday morning, its winds had dropped to about 65 mph, just below hurricane status.

But Irene's barometric pressure was at 965 millibars, a surprisingly low reading for a non-hurricane. For example when Hurricane Wilma, then a Category 3, struck the Florida Keys in October 2005, the storm's barometric pressure reading was roughly equivalent, at 950 millibars.

On Monday morning Irene was still going, if not so strong, according to Richard Pasch, senior hurricane specialist at the U.S. National Hurricane Center in Miami.
Apparently out of lucky breaks, the former hurricane swept over eastern Canada with winds of about 45 miles (72 kilometers) an hour, Pasch said.

Text 6.

Hurricane Irene Hits North Carolina; New York Braces for Storm

Weakened Irene still dangerous as it moves up East Coast, experts warn.

Willie Drye
for National Geographic News
Published August 27, 2011

Hurricane Irene brought winds of 85 miles (137 kilometers) an hour and flooding when it made landfall near Cape Lookout, North Carolina, around 7:30 a.m. ET today as a Category 1 hurricane.

But the storm could have been even stronger—dry air pulled into Irene's circulation late Friday afternoon slightly weakened the tempest.

Hurricanes are sustained by warm, moist air, and the infusion of dry air at about 10,000 feet (3,050 meters) slowed Irene's momentum and caused its eye wall—where the storm's strongest winds are found—to deteriorate, said meteorologist Keith Blackwell.

Had the dry air not been pulled into the storm, Hurricane Irene could have had winds well in excess of 110 miles (177 kilometers) an hour at landfall, said Blackwell, of the University of South Alabama's Coastal Weather Research Center.

Still, the storm spun off tornadoes and dumped torrential rains on coastal North Carolina. Brian Roth, mayor of the coastal town of Plymouth, said the region started losing power soon after Hurricane Irene came ashore, and damage to some houses there has been reported.

"The wind is howling," said Bill Benjamin, general manager of WPNC radio in Plymouth. "It's nothing for anyone to be out in."

Hurricane Irene to Batter Jersey Shore?

Hurricane Irene is expected to continue its destructive trek up the East Coast over the next two days, and experts say the large, slow-moving storm could still be at hurricane strength when it makes landfall again near New York City.

Already New York City officials have ordered more than 300,000 residents to evacuate low-lying areas that are expected to see the worst of the flooding. The city's public transportation system was also ordered to be shut down Saturday.

Jeff Masters, a meteorologist at the Weather Underground website, said the New Jersey shore could be especially hard hit. Waves as high as 15 to 20 feet (4.5 to 6 meters) could batter the Jersey coast, causing serious damage in a region that's not used to hurricanes.

"They just don't get these kinds of events there," Masters said. "I anticipate a lot of damage along the New Jersey coastline."

Parts of Long Island, New York, could see storm surges of up to 8 feet (2.4 meters) when Irene reaches there Sunday morning, Masters said.

Early damage estimates predict that Hurricane Irene could cost as much as U.S. $12 billion by the time it crosses over New England early Monday morning.

Text 7.

Japan Quake Lifted Seabed 16 Stories—Largest Recorded

Giant slip may have spawned deadly tsunami, study says.

Richard A. Lovett
for National Geographic News
Published December 1, 2011

Japan's devastating March 11 earthquake shifted the seabed by as much as 165 feet (50 meters)—the largest slip yet recorded, a new study says.

That's considerably larger than in previous reports, which in May put the shift at 79 feet (24 meters).

(See 20 unforgettable pictures of the aftermath of the Japan earthquake and tsunami.)

This giant movement probably caused the massive tsunami that killed more than 15,000 people and crippled the Fukushima Daiichi nuclear power plant (pictures).

For the study, Toshiya Fujiwara and colleagues at the Japan Agency for Marine-Earth Science and Technology compared seabed maps made in 1999 and 2004 to those made only days after the March quake.

Their analysis also revealed the seabed may also have risen by as much as 33 feet (10 meters).

"This is a very important piece of work, in some ways that may not be obvious at all," said Chris Goldfinger, a marine geologist at Oregon State University who was not part of the study team.

The earthquake was the first in a subduction zone—a place where one tectonic plate is diving under another—in which scientists have been able to look directly at movement of pieces of Earth's crust right up to the edge of the fault line.

Japan Quake Study at a "New Level"

Because subduction-zone earthquakes occur deep beneath the ocean, they are invisible from land.

In the past, scientists have had to deduce seabed shifts via seismic waves emitted by an earthquake. But that requires computer modeling, and the results can be frustratingly uncertain, Goldfinger said by email.

For example, the results may be specific to the model and are unable to capture the shifts at high resolution or with great accuracy.

But the new research, to be published tomorrow in the journal *Science*, will "open up a new level" in understanding how subduction zones behave and generate tsunamis, he said.

Before-and-After Quake Picture Not Perfect

Even so, the before-and-after pictures of the seabed shift aren't perfect, Goldfinger cautioned.

The Japanese team's original surveys were taken several years before the earthquake, and the "after" surveys were taken nearly two weeks later.

"The displacement [of the seabed] included everything that occurred between the surveys," he said.

That includes not only the devastating earthquake but its aftershocks, as well as any less destructive "creeps"—or small movements—that might have occurred before the March temblor.

Still, it's a major find, he said, because few subduction zones have been mapped well enough to allow such before-and-after images to be compared at all.

Text 8.

2011 Among Hottest Years, Marked by Extreme Weather

Not even cooling La Niña could take edge off warming trend.

Richard A. Lovett
for National Geographic News
Published November 30, 2011

This year is shaping up to be one of the ten hottest years on record, according to a United Nations report announced yesterday.

Likewise, 2011 may be the hottest year on record during La Niña, a periodic cooling of the eastern tropical Pacific.

That's a bad sign, since La Niña years are generally relatively cool, said Steven Running, a professor of ecology at the University of Montana, who was not part of the study team.

So the new finding suggests that La Niña conditions that once produced strong global cooling now only slightly affect the overall temperature trend, Running said by email.

"What does it take now to have a cooling cycle?" he asked. "And what will happen in the next strong El Niño?"

El Niño is a warming of tropical waters in the central and eastern Pacific Ocean. During El Niño years, the warmer currents heat the planet on top of the steady global warming trend caused by human-induced greenhouse gases.

Based on data from 189 countries, the World Meteorological Organization (WMO) report was presented at an international climate conference this week in Durban, South Africa.

Climate Hot, and Getting Hotter

The report also found that all but two of the overall 15 hottest years since record-keeping began in 1850 have occurred between 1997 and 2011.

In addition, sea ice coverage was the second lowest on record. The lowest occurred in 2007.

Even that figure might be deceptively optimistic, because much of the sea ice appears to have been thinner than in past years. When sea ice cover was at its smallest in 2011, on September 9, the total Arctic sea ice volume was 8 percent lower than in 2010—previously the lowest on record, the WMO scientists found.

The WMO's Global Atmosphere Watch program also recently released a report concluding that heat-trapping greenhouse gases in the atmosphere had reached a new high—an increase that will only continue, researchers say.

"Our science is solid, and it proves unequivocally that the world is warming and that this warming is due to human activities," WMO Secretary-General Michel Jarraud said in a statement addressing both reports.

Floods, Droughts: A Year of Climate Extremes

This year was also full of extremes, according to this week's report.

Not surprisingly, given the high rates of melting in the Arctic, many Arctic regions were unusually hot. Parts of northern Russia reported springtime temperatures more than 16°F (9°C) above average, the WMO said.

But there was plenty of other extreme weather elsewhere. For instance:

- Finland, Armenia, Central America, and Spain all reported record heat.
- It was the driest spring on record in many parts of western Europe, followed in some areas by the wettest summer.
- East Africa experienced severe drought followed by flooding.

- Other severe floods, often deadly, occurred in Southeast Asia, Brazil, Australia, Southern Africa, Central America, and Pakistan. (Read: "Extreme Storms and Floods Concretely Linked to Climate Change?")
- Tropical cyclone and hurricane activity was unusually low, although not as low as in 2010 (which had the lowest storm count since satellites first allowed accurate record keeping).

Texas-Size Temperature Rise

Extremes were also present in the U.S. and Canada, where conditions ranged from drought and heat in the South to heavy snowpack in the Midwest to record-breaking rainfall in the Northeast.

It was also the third worst U.S. tornado season since 1950, after 2004 and 2008.

But the most stunning figures may have come from Texas, where daily temperatures averaged 86.7° (30.4°C), in June through August—a staggering 5.4°F (3.0°C) above normal, scientists said.

The Texas statistic is "the highest [such average] ever recorded for any American state," according to the WMO website.

It's difficult to determine exactly how much of the extremes are due to climate change versus normal weather variations, said Richard Alley, a geoscientist at Pennsylvania State University, who was not part of the WMO team. "The increasing carbon dioxide and other greenhouse gases in the air from our activities do not make 'weather' disappear," he said by email. "But they do 'load the dice' to make hot conditions more likely.

"We haven't made cold snaps, and even record lows, disappear, but data and our physical understanding agree that we're still pushing strongly toward warming."

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