J. コンドルによる濃尾地震後における造家学会演説の英文原稿について

Study on the English manuscript of the speech in the Society of Japanese Architrcts after the Nobi Earthquake by Josiah Conder

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J. Condor investigated the stricken area of the Nobi earthquake generated on October 28, 1891. Based on the result, J. Condor made a speech at the Society of Japanese Architects in the next year, and the contents were placed in the Journal of the institute of Japanese Architects later. However, the precision of speech contents hasn't considered conventionally because the English manuscript of this speech hasn't informed it. I examine the contents in this report by showing the English manuscript of this speech placed in the Japan Weekly Mail. in a side-by-side translation form. The contents cope well when I look over both, and the speech of J. Condor didn't have the abbreviation with both Japanese-to-English sentences either. But questions and answers part after the speech is not listed in The Japan Weekly Mail., and this is written down only to the Journal of the institute of Japanese Architects.

キーワード：濃尾地震、コンドル

Keywords：the Nobi earthquake, J.Conder

1　はじめに

1852 年生まれの J. コンドルは、お雇い外国人として明治 10(1877)年に来日し、工部大学校教師及び工部省顧問として黎明期の日本におけるに近代的な建築の普及に尽力した。明治 17(1884)年には工部大学校を解職となるが、明治 21(1888)年までは講師として職に留まった。以後は建築事務所を開き、特に三菱との関係が深くいわゆる丸の内における一丁倫敦の建築にも関わり、大正 9 (1920)年、東京において 67 才で逝去した[1]。

ところで三菱一号館の建築に先立ち、コンドルは明治 24(1891)年 10 月 28 日に発生した濃尾地震の被災地を調査したことが知られている。その詳細については別稿に示した通り[2]であるが、その成果に基づいて、コンドルは地震の翌年、造家学会において演説を実施し、その内容は、後日、造家学会の機関誌である『建築雑誌』に、明治 25(1892)年 3 月号から 3 回に分けて掲載された[3]。しかし、この演説については英文原稿が伝えられていないため、『建築雑誌』に掲載される演説内容がどれ程の精度を持つものであるのか、従来は検討もなされていない。

そこで、本稿ではコンドルによる演説の英文原稿を示し、これと『建築雑誌』の記録を対訳形式で示すことで、その内容の検討を行うことを目的とする。

2　コンドルによる濃尾地震に関する建築学会演説日時と原稿

コンドルによる濃尾地震に関する造家学会の演説については、『建築雑誌』における本会記事として日時と演説会場、参会者数等が以下のように報告されている[4]。

○明治廿五年一月廿七日午後六時ヨリ京橋区西紺屋町地学協会会堂ニ於テ本会通常会ヲ開キタリ出席ハ正員拾三名特別員一名賛助員三名准員百八拾五名合計弐百弐名ナリシ而シテ講演ハ左ノ如シ

一空気及光線ノ話　　正員　中浜西次郎君

一諸種建物ニ関シ近時ノ地震ノ結果　名誉員　ゼ、コンドル君

右通訳　　正員　滝 大 吉 君

右午後十時三十分ニ畢テ各退出

即ちこの演説は造家学会通常会における演説として地学協会会堂でなされたものであることが明らかである。

一方、この演説原稿と考えられるものが、『The Japan Weekly Mail.』の明治 25(1892)年 1 月 30 日号[5]に見ることができる。内容は後掲の通りであるが、英文原稿において先ず題名は

EARTHGUAKE VERSUS BUILDINGS.

［和訳］地震対建築

とするが、これは『建築雑誌』の本会記事で“諸種建物ニ関シ近時ノ地震ノ結果”、後の演説記事で“各種建物ニ関シ近来ノ地震ノ結果”[6]とするものとやや趣が異なるものとなっている。続いて『The Japan Weekly Mail.』では

BY JOSIAH CONDER, F.R.I.B.A.,

READ BEFORE THE SOCIETY OF JAPANESE ARCHITECTS,

JANUARY 27TH, 1892.

［和訳］ジョサイア・コンドル（F.R.I.B.A.）によって日本の造家学会において演説

1892 年 1 月 27 日

とし、対応する文章が『建築雑誌』にはない。なお、2 行目冒頭の “READ” は建築学会における標題に準じ“演説”と訳したが、『The Japan Weekly Mail.』側のものが演説原稿であったことを示すものであろう。なお、演説の実施日を明治 25(1892)年 1 月 27 日とする点は、前掲の造家学会の記事とも合致するものである。

3　コンドルによる濃尾地震に関する建築学会演説の英文と和文の比較

以下において、コンドルによってなされた演説について、『The Japan Weekly Mail.』に掲載される英文原稿と『建築雑誌』に掲載された和文原稿を対訳形式で示した。

両者を通覧すると内容はよく対応するものであること

が理解され、コンドルの演説について日英両文とも省略などは見られない。但し、演説後の質疑応答部分が『The Japan Weekly Mail.』側には記載されず、これは『建築雑誌』にのみ記される。なお、以下の引用で『建築雑誌』に掲載される図版は省略した。

注

1 村松貞次郎：コンドル－明治期における国家と一浪漫主義建築家、お雇い外国人 15 建築・土木、18 ～ 50 頁、昭和 51(1976). 3

2 平山 : J. コンドルによる濃尾地震調査の研究 (1) ～ (3)、日本建築学会東海支部研究報告集 53、613 ～ 624 頁、平成 27(2015). 2

3 造家学会 : 建築雑誌 63、63 ～ 67 頁、明治 25(1892). 3 、建築雑誌 64、92 ～ 99 頁、明治 25(1892). 4 、建築雑誌 65、132 ～ 137 頁、明治 25(1892). 5

4 造家学会 : 建築雑誌 62、本会記事、33 頁、明治 25(1892). 2

5 Japan Mail 社 : The Japan Weekly Mail.、明治 25(1892). 1 /30、153 ～ 154 頁

6 造家学会 : 建築雑誌 63、63 頁、前掲

英文－和文対訳の凡例

・英文はなるべく原文に則り、段落における改行を示した。なお、イタリック体は原文によるものである。
・英文の各文文頭に〇囲み数字を配し、対応する和文に同じ〇囲み数字を付した。また、英文の配列を基本とし、段落ごとに英文及び和文の位置を調整した。
・和文原文における変体仮名はひらがなに、旧字体は新字体に改めた。
・和文における向って右側の傍線は上線、向かって左側の傍線は下線とした。
・和文の巻頭巻末などに存在する独自の文章の場合、英文側に対応する文章がないために空白とした。

THE JAPAN WEEKLY MAIL. Jan. 30, 1892. p.153

EARTHQUAKE VERSUS BUILDINGS.

BY JOSIAH CONDER, F.R.I.B.A.,
READ BEFORE THE SOCIETY OF JAPANESE ARCHITECTS,
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建築雑誌　63号　明治25(1892)年3月

○演　説

○各種建物ニ関シ近来ノ地震ノ結果
名誉員　ゼー、コンドル氏演説
正　員　瀧　　大　吉氏口訳
市　東　謙　吉　速記

GENTLEMEN,— ① In treating the subject of the effect of last October's earthquake upon different buildings, on a former occasion I called attention to certain points which it appeared the general public were inclined to lose sight of, owing to the very natural alarm created. ② At times of panic, strong impressions are produced, leading on the one hand to indiscriminate condemnation, and on the other to the favouring of remedies which have the one important defect of treating lightly all considerations but that which the event of the moment has rendered prominent. ③ The general distrust of brick and stone buildings, because the upper portions of certain cheaply constructed examples had fallen, and a feeling in favour of structures in the old Japanese style, because a few castles and temples remained erect, are illustrations of this tendency.

④ Careful observations in the affected districts showed that such inferences were not tobe reasonably drawn from an intelligent examination of results.

⑤ It had been claimed for the ordinary Japanese structure that it was designed with a view of resisting earthquake. ⑥ I am not aware that its builders ever originated such a claim, but this reputation has been over and again thrust upon them by different writers. ⑦ The comparative isolation of foundations and the possibility of movement in the framework of such buildings were demonstrated to be advantages specially calculated to contend with severe seismic movement. ⑧ The result of my own observation is however, that these very qualities, together with the absence of others to be found in the commonest European structure, have been the chief causes of almost total destruction. ⑨ The enormous mass and weight of material in the heavier Japanese monuments, built upon similar principles, have neutralized to a great extent these inherent defects. ⑩ It seems to me by no means an exaggerated argument to say that,

①昨年十月起リマシタ地震ガ各種ノ建物ニ見ハシタル結果ニ就キマシテハ前回私ガ能弁学会デ演説イタシマシタ時分ニハ唯其或ル部分ニ付テ述ベマシタ、②其演説ノ理屈ト云ヒマスモノハ此震災後人心ガ恟々トシテ居ツタガ為メニ世人ハ只目先キノ事許リニ聯結シテドウモ精シク其原因ニ立入ツテ調ベルト云フ感覚ガ自然薄クナツテ居テサウ悪ク言ハヌデモ宜イ様ナモノデモ無闇ニ之ヲイケヌト云ヒ且徒ラニ旧風ヲ挽回セントスル様ナ傾キガ大変アリ其着目ヲ誤ツタ様デシタカラ夫レガ理由デアツテドウカ広ク公衆ニ注意ヲ与ヘタイト思ツテ其演説ヲイタシタ訳デアリマス
③偖其世人一般ノ考ト云ヒマスルモノハ何カト云ヘバ煉瓦ヤ石ノ建物ト云フモノハイケヌト云フ事ニナツタ、夫レハナゼカト云フニ本当ノ構造法ニナツテ居ラヌ所ノ極ク安普請ノ煉瓦石造ノ家ナドガ毀ハレタ為メデアリマス夫レカラシテ日本ノ旧来ノ建物ガ宜イト云フ事ガ最モ人ノ心ニ染ミ込ンダト云フ有様デアリマシセウ、
④※1併シ能ク注意シテ見ルト震災地ノ実例デハ全クサウデモナイト云フ事実ガ挙ツテ参リマシタ
⑤能ク世間デハ日本ノ家屋ノ建テ方ト云フモノハ地震ニ能ク耐ヘル目的デ出来テ居ルト云フ様ナ事ヲ申シテ居リマス、⑥併シ此日本ノ家ヲ建テタ人々ハ果シテ其処迄考ヘテ建テタモノデ有ラウカ如何デシヨウカ近来ノ学者達ガ頻リニ今申ス様ナ名誉ヲ博シ得ル様ニ云ハレマスルガ夫レハドウモ充分ニ信用ハ出来ナイ、⑦地業ヲ別々ニスル事ヤ組合セタル木材ガ勝手ニ捻レテ動ケルト云フ様ナ事カラシテ日本風ノ家屋ハ烈シイ地震ヲ凌グ特種ノ性質ヲ具ヘタルモノナリト云ヒマスガ⑧私ガ実地視察シタル所デハ其地震ヲ凌グト云フ特種ノ性質ヲ具ヘタル㕝ト今一ツハ欧羅巴風ノ建物ナラバ粗末ノ普請ニモ必ス用ヒテアル程ノ構造物ノ無カツタノガ日本風家屋ノコワレタル重ナル原因ノ様ニ見エマス⑨構造ハ夫レト少シモ替ハラズニ重(ラモ)イ材料ヲ沢山ツカツテ出来テ居ル堂宮ノ様ナ日本ノ宏大ナル建物ハ地震ノ害ヲ受ケタモノガ大変ニ少ナカツタ
⑩サア此処デス若シ接ギ手ガ勝手ニ動ケタリ又地業ガ別々ニナツテ居ルノガ世人ノ信スル通リ日本家屋ノ地震ニ耐エ

had the looseness of joints and isolation of foundations the merits attributed to them, the best results should have followed in the ordinary and comparatively light buildings, in which these qualities were unopposed by enormous weight, mass, and friction. ⑪ These facts seem now to be tacitly admitted by those who were once inclined towards ancient methods of building, and there is lately a movement for improving common Japanese structures, which is worthy of all encouragement, amounting to nothing more or less, I imagine, than introducing Europeans principles of jointing and stiffening into such constructions.

⑫ I think, therefore, that there can be no question among practical architects of applying ancient methods of construction to ordinary modern buildings, even supposing that the social conditions and economic considerations of modern times rendered such attempts feasible.

⑬ It is a very regrettable fact, but one which must I fear be admitted, that the art which we profess can never aspire in this country to that freedom and perfection which it has attained in countries undisturbed by frequent seismic convulsion. ⑭ Architecture may perhaps hope to make advances as a *science* which will compensate to some extent for lack of *artistic* development.

⑮ The architect will always be cramped and confined in his creations by a fear of this dreaded enemy of stability. ⑯ We have been accused of apathy in respect of the contingency of earthquake, but I cannot see that an examination of our modest and cautious construction in any way justifies such accusations. ⑰ We have not, perhaps, been able to announce some new "panacea" for earthquake not adopt too credulously theories advanced by others. ⑱ Possibly our methods have seemed too experimental or common-place, and lacking interesting novelty to proclaim them from the housetops.

⑲ The earthquake of October 28th, 1891, has given most of us the first opportunity of personally observing the actual effects of a shock of great violence upon different kinds of buildings, and I think it is to the credit of the profession that there is scarcely a modern architect of position in Japan who has not made use of the occasion by hastening to the affected localities in order to examine, and collect information from, all classes of structures. ⑳ I do not wish to underrate the value of previously published observations and regulations gathered from other earthquake countries, but these regulations are for the most part based upon special conditions peculiar to those countries. ㉑ Architects are greatly indebted to the valuable research and information as well as to useful suggestions advanced from time to time by the Seismological Society of Japan, and all conclusions not too speculative to be hastily applied, have, I think, been availed

ル性質デアルナラバ堂宮ノ様ナ極ク重(ヲモ)タイモノデナク普通ノ軽イ家ノ方ガ却テ自由ニ動ケル訳デアリマスカラ其結果ガ宜クナケレバナラナイト申シテモ強(アナガ)チ過言デハアリマスマイ

⑪併シ以前ハ日本家ノ方ガ地震ニ宜イト云テ居タ人モ現今ニ至リマシテハ其反対ノ事実ヲ黙諾スル㆓トナリ追々日本ノ家屋ヲ改良スル方ニ傾イテ居ル様デアリマスシ至極望マシキ㆒デアリマスガ其改良ト申シマスルハ即チ欧羅巴風ノ接ギ手ヤ筋違ナドヲ入レテ構造物ヲ堅牢ニスル事デアラウト思ヒマス、

⑫依テ私ノ考ヘデハ今日建築事業ニ従事シテ居ル人ノ間デハ縦令ヒ社会ノ有様ヤ経済ノ点デドウアラウトモ当世普通ノ建物ニ日本古風ノ構造法ヲ用ユル事ハ到底イケヌト云フノハモー云フ迄モナク分リ切ツテ居ル様ニ思ハレマス

⑬併シ茲ニ寔トニ悲イ事ガアルト云フノハ此建築ト云フモノハ此日本即チ屢々地震ヲ受ケル国デハ其懸念ナキ外国デ自由ニ発達シタ様ナ工合ニ発達シテ往ク事ハ到底出来マイト云フ事デアリマス、⑭是カラ推シ量レバ日本ノ建築学ハ詰リ美術的ノ進化ガ少キ代リニ地震建築ノ学術トシテ進歩シテ往クト云フ事ハ将来ノ結果デアラウト考ヘラレマス

⑮日本ノ建築家ハ家屋安ヲ妨ゲル怖ルベキ強敵即チ地震ノ事ヲ始終脳髄ニ抱イテ居ル為メニ其為ス所ガ始終掣肘セラレテ充分ニ働キヲスル事ガ出来マイト思ヒマス、⑯往々世間ノ人ハ我々建築ニ従事シテ居ルモノニハ地震ノ考ト云フモノガ丸デ無カツタカノ様ニ攻撃シマスルガ、併シ今日マデトテモ銘々共ハ随分斯ウシタラ宜カラウ、アーシタラ宜カラウト云フ辺ノ考カラ充分ニ注意ヲシテ遣ツテ居タノデアリマシテ其攻撃ハ甘ンジテ受ケル訳ニハマイリマセヌ、⑰偖サウハ言ヒマスモノヽ、是レナラバ地震ニ耐エルノ適薬トモ云フベキ程ノ新規ノ構造ヲ施コシタルデハナク⑱申フサバ斯ウモシタラ善カラウカト思テナシタル試験ニ類シ又人目ヲ驚カスニモ足ラザル普通在リ来リノ法ニ念ヲ入レタル位デアツタノデス

⑲左レバ昨年十月二十八日ニ起ツタ大地震ハ実ニ我々共ニ親シク震災ノ結果ヲ検分セシムル所ノ好機会ヲ与ヘタモノデアリマス其際ニ当リテ建築社会ノ先ツ名誉ト看做シテモ宜イト思ヒマスル㆓ハ日本ニ居ツテ当世ノ建築家ト云ハルヽ人ハ官民ノ差別ナク挙ツテ早ク震災地ニ出張シ綿密ニ被害ノ実況ヲ視察シテアルトアラユル建築カラ地震結果ノ種々ナル材料ヲ集メタト云フ事テアリマス

⑳併シ斯ウハ申シマスルモノヽ、是ヨリ前既ニ海外ノ地震国デ採集編成シタル地震ノ結果ヤ耐震建築条例ヲ私ハ無益デアルト云フノデハアリマセヌ是レ皆大ヒニ価値ノアルモノデスガ奈ンセン其条例ナドハ其国々ノ情況ニ由テ基ク所ガ違(チガイ)マスカラ日本ニ当テ箝メル訳ニハマイリマセヌ㉑我々建築家ハ日本地震学会デ絶エズ研究シテ居リマスル事ヤ其報告及ヒ考案等ノ為メニハ大変ニ利益ヲ得テ居ルノデスガ其論定スル所ニシテ余リ理論ニ走ル様ナ事ハ先建築家ハ早マツテ用ヒタル㆓ナキ様デス

㉒彼ノ有名ナルいすきやデ出来マシタ所ノ建築条例ヲ見マ

of by them as far as possible. ㉒ The regulations for Ischia are directed chiefly against high buildings of the coarsest rubble masonry with stone vaults and other methods of construction which the boldest builder in Japan has never dared to attempt. ㉓ The Manila regulations also apply chiefly to local methods of building with materials peculiar to the district. ㉔ The general conclusion contained in the latter ordinance is interesting and reassuring, and might be in some measure applied to recent conditions in Japan. ㉕ It says, "In general it has been ascertained that when the construction has been performed properly with all classes of materials the buildings remain intact with slight injuries.・・・・Most of the government buildings which were ruined or suffered injury had notorious vices of construction or considerable defects of execution, or they had been actually condemned."

㉖ Of special value to practical builders are the numerous notes and sketches collected by gentlemen of the architectural profession from the damaged buildings Aichi and Gifu *kens*, and which, when published will form a most useful reference for future guidance. ㉗ It is also a matter for congratulation that the Society of Architects have now taken the initiative in drawing up certain principles with regard to buildings erected in Japan with a view of giving them a maximum resistance to earthquake. ㉘ Any regulations issued to protect the public from unnecessary danger in the time of earthquake, must of course take into account other imperative demands connected with modern building, local conditions, and the public safety, and a body of trained and experienced practitioners are undoubtedly the most competent to deal intelligently with such regulations. ㉙ To them the Government must come for advice and assistance when legislating in such matters.

㉚ It is impossible to traverse in a single lecture the numerous details which call for professional attention in the subject of building with relation to earthquake. ㉛ I shall limit myself therefore to-night to a few general remarks based upon actual observation in the affected districts and subsequent reflection.

㉜ First, with regard to brick buildings, the Committee of Building Regulations for Ischia say "A long experience in Italy and especially in Sienna, has proved that brick work is excellent on account of its resistance." ㉝ Again, in the regulations for building in Manila the Committee give preference among solid constructions, first to cement concrete, then to brick work, saying: – "Constructions which present the greatest number of joints are preferred on account of the elasticity which they possess." ㉞ It is everywhere taken for granted that for certain classes of buildings some kind of solid fireproof construction is necessary, and brickwork is considered to have important advantages among solid materials. ㉟ The

スルニ此規則ハ重モニ丸石野面（ノヅラ）石ヲ積ミ上ケテ高イ家ヲ建テル事ニ付テ制限ヲ置キ又ハ石ノ丸天井ヲ拵ヘタリ其他日本ノ地震国ニ於テハドンナ乱暴ナ建築家デモ滅多ニ遣リサウモナイ様ナ事ノ行ハレテ居ル事ヲ制限シタノデアル

㉓又まにらニ出来テ居ル建築規則ト云フモノハまにらニ限ツタ建築法ヤ又ハ材料ニ付テ此地方限リノ事ヲ制限シタモノデアル、㉔此まにらノ建築規則ノ一番末条ニ斯ウ云フ事ガ有リマス、之レハ至極面白イ事デアツテ又今日ノ如ク石造ヤ煉瓦造ノ家屋ガ甚ダ評判ノ悪イ際ニハ余程参考トスルニ足リマシヨウカ㉕試ミニ之ヲ採摘シテ申シマスレバ曰ク一般ニ確カメタ所ニテハ建築ハ如何ナル材料ヲ用ヰルトモ其構造法ニシテ極ク至当ナモノニ出来上ツテ居ルナラバ左程ニヒドイ害ヲ蒙ムラヌデ済ム、夫レカラ中頃ハ略シマシテ次ニ曰ク大地震ノ時ニ大変害ヲ受ケタル政府所属ノ建物ノ多クハ其構造法ガ丸デ法ニ適（カナ）ハナカツタリ、又ハ欠点ガ多カツタリシテ是等ノ家屋ハ地震前カラシテ業ニ既ニ悪評ヲ蒙ツテ居ツタモノナリトアリマス

㉖爰ニ今日我々共ノ建築社会デ大層有用ナモノガアリマス是レハ外デモアリマセヌ愛知岐阜両県下ノ震災ノ為メニ害ヲ蒙ツタ家屋等ニ就キテ建築家諸氏ガ集メラレタ所ノ材料デアリマス、サウシテ此材料ヲ印刷シテ世ニ示ス様ニシマシタナラバ将来家屋ヲ構造スル点ニ於テ非常ナル利益ヲ与ヘル事ダラウト思ツテ居リマスル㉗又爰ニ賀スヘク慶スベキ事アリト申シマスルハ此造家学会ニ於キマシテハ今後日本デ地震ヲ防クニ足ル様ナ家ヲ建テルニハドウ云フ方法構造ニナシタラ宜イカト云フ事ニ就テ昨今研究中デアルト云フ事デアリマス、㉘凡ソ地震ノ時ニ危害ヲ防グ様ナ条例等ヲ定メル場合ニ臨ミマスル時ニハ只地震バカカリデナシニ今日ノ家屋ニ付テ必要ナル色々ノ事モ有リマセウシ、又公衆ノ安全ヲ勿論保護スル様ナ精神ヲ忘レヌ様ニセネバナラヌ、此外尚ホ学識アリ経験アル実地家ノ団体ト云フモノハ無論此事ニ付テ専ラニ研究スベキ適当ノモノデアラウト思ヒマスカラ㉙政府デ若シ建築規則ヲ定メルナラバドウカ此造家学会ノ様ナ団体ノ意見ヲ聞キ尚ホ夫レト協議シテ充分ナル規則ヲ拵ヘル様ニ希望致シマス」

㉚諸君地震建築ニ付テ色々細密ナル事ヲ科学的ニ申上ルト云フコトハ到底時間ガ御坐リマセヌデ出来マセヌ㉛カラ今晩ハ被害地ニ臨ミマシテ観察シタル所ト其後熟考シタル所ニ就イテ大体ノ事ヲ申上ル積リデアリマス

㉜夫レデ第一番ニ煉瓦家屋ノ事ニ付テ申上マスレバいすきやデ出来マシタ建築条例ヲ定メル時分ノ委員会ノ説ニ依リマスルト伊太利、しゝりー辺リノ永イ間ダノ実験ノ結果ニテハ煉化※2石造ト云フモノハ其効力ノ強イモノデ地震ノ時ニハ最モ有効ノモノデアルト云ヒ㉝又まにらノ地震建築条例ニ依リマスルト条例取調委員ノ考ヘデハ凡ソ家屋ノ堅実ナル構造ノ中デ一番宜イノハせめんとこんくりーと其次ハ煉化石造ダト云フ事デ其条例ノ中ニ接手ノ沢山アルモノハ弾力性ガ多イカラ善イ訳ダト載セテアリマス

㉞夫レカラ今ノ条例外デゴザリマスガ建物ニ依テハ啻ニ地震ニ耐エル許リデハナシニ火災ノ時分ニモ焼ケナイ様ナ構造ニセネバナラヌト云フ事ハ今日一般ニ首肯スル所デアツテサウシテ斯ル構造ノ建築ニハ外ノ材料ニ較ベテ見ルト煉

severe test lately given to brick buildings in Nagoya does not confirm this opinion in the case of those lightly and cheaply constructed, and leads to the conclusion that extreme care and special precautions are required in the execution of brick structures. ㊱ On the other hand, both Nagoya and Osaka afford us examples of a better class of brick structure giving somewhat different results. ㊲ The reducing of heavily weighted walls to a minimum thickness, the use of inferior mortar, and neglect in properly saturating the bricks, and the dispensing with continuous cross and transverse walls, are some of the defects easily discoverable in the damaged buildings. ㊳ To a great extent these defects are such as are in glaring disobedience to the common precautions followed in substantial brick construction; and they indicate the necessity for more stringent and expert control in the execution of such works. ㊴ There are, however, other points attracting attention in which the accepted standards for secure building on a quiescent soil cannot be said to have been violated, and which prove the necessity of special modifications and improvements for earthquake regions. ㊵ The combination of very unequal masses in one block, the connection of towers, turrets, and wings, the use of pediments, cornices, chimney tops, and parapets, and also the construction and connection of floors and roofs, are all matters which attract attention and call for improvement and invention.

化石ガ一番宜カラウト云フ考デアリマス
㉟然ルニ名古屋ニアツタ煉瓦造ノ家屋ハ今度ノ地震ニテ反対ノ結果ヲ見マシタトハ云ヘ是レハ全ク不丈夫ト安普請トガ原因トナツタノデアリマスカラ将来煉瓦家屋ヲ建テルニ付テハ非常ナ注意ヲシ尚ホ十分ニ予防等ヲ加ヘテ尽シテ往カネバナラヌト云フ事ガ分ツテ参リマス、㊱名古[※3]屋デモ大坂デモ上等ニ出来上ツタ家屋ハ今度ノ地震ニ遭テ今申シタ安普請トハ結果ヲ異ニシマシタ㊲非常ナ荷ヲ受ケテ居ル煉瓦ノ壁ヲ極ク薄クシタリ又ハ力ノ弱ヒもるたるヲ用ヰタリ又ハ煉瓦石ヲ水ニ浸(シン)ス事ヲ怠リ若クハ仕切壁ヲ省イタリ何カシタ事ガ被害家屋ノ欠点ノ廉々デアツタト云フ事ハ今度ノ被害地ニ付テ見ルト寔ニ明瞭ニ分ツテ来ル、㊳要スルニ是等ノ欠点ト云ヒマスルモノハ堅牢ナル煉瓦構造法ニ付テ定ツテ居ル所ノ規則ト云フモノヲ丸ツ切リ背イタト云フノガ原因デ将来ハ箇様ナ仕事ヲスルニハ綿密ナル老練家ノ監督ガ必要デアルト云フ事ノ実例ヲ示シテ参ツタノデアリマス
㊴併シ未ダ外ニ注意シナケレバナラヌ事ガアル、夫ハ何カト云ヘバシツカリト落付テ居ル地層ニ丈夫ニ建テタル家ハ最良ナリトシテアル通リ実際如何ニモ其通リテアリマスカラ地震国ノ建築ニハ将来格段ナル変更ヤラ改良ヲ施サネバナリマセヌト申事デアリマス
㊵夫レデ何ガ一番悪イカト申シマスルト一ツノ家屋ノ中ニ大小均シカラサル部分ガアツタリ又屋根(ツノヤ)ノ上ヘ高ク出テ居ル塔ヤ小サイ家ニ用ヰル塔ヤ又ハ角屋等ヲ一緒ニシタリ夫レカラ甍(イラカ)ヤ軒蛇腹ヤ烟突ノ頭ヤ軒先キノ低イ壁即チ軒先壁等ヲ用ヰル事、又床ヤ屋根ノ構造法ト夫レカラ其取付ケ方ト云フ様ナ事ハ将来改良ヲ要スル点デアリ注意ヲセネバナラヌモノデアリマス　（已下闕出）

建築雑誌　64号　明治25(1892)年4月

○演　説

○各種建物ニ関シ近来ノ地震ノ結果（承前）

名誉員　ゼー、コンドル氏演説
正　員　瀧　　大　吉氏口訳
　　市　東　謙　吉　速記

㊶ As I hinted before, we must be willing if necessary to make a sacrifice of the orthodox and accepted canons of *style* as followed in modern European architecture. ㊷ So far as we introduce decorative features into our designs we must subject them to careful analysis from a seismological standard and reject or modify them accordingly. ㊸ Perhaps it is not absolutely unavoidable that this should result in the erection of hideously ugly buildings, for it may be possible finallu to devise a style of design possessing artistic attractions consistent with a maximum of seismic stability. ㊹ This is not so hard a task perhaps as to reconcile some of the modifications which precautions against earthquake suggest with other

㊶前ニ一寸諸君ノ御注意ヲ促ガシテ置キマシタ通リニ日本ノ地震建築ハ今日用ヒ居ル欧羅巴風ノ建築ノ流派ニハ少々位ハ背イテモ仕方ハアルマイト云フ考デアリマス、㊷夫レデ兎ニ角此装飾ニ属スル形体ヲ構造物ニ用ヰル場合ニハ流派ニ適ツテ居ルカ居ラヌカト云フノ論ヨリモ細カク之ヲ分析シテ地震ニ対シテハ如何様ナル結果ヲ生スルカト云フ事ヲ考ヘ之ニ由テ之ヲ取捨モシ変更モシナケレバナラント思フ、㊸サウシテ見マスルト妙ナモノニナリサウデ御坐リマスルガ、マサカ極ク極ク不格構ナ家ヲ建テネバナラヌトモ限ルマイカト思ハレマス、追々ハ耐震ノ性質ヲ具ヘテ居テ又美術上ニモ適フ様ナモノガ出来ルト云フ事ハ随分行ハレ得ル事ダラウト思ヒマス、㊹此事ハ随分六ヅカシイ様デハアリマスガ地震学デ論ズル如キ土地ノ気候ノ考ヘヤ又日常

climatic and utilitarian considerations equally pressing.

㊺ Whatever theories may be maintained concerning freedom in the connections of *wooden* structures, (and I am inclined to think that these are somewhat illusionary) one great element of safety in *brick* structures is undoubtedly the continuous and equal bounding together of their different parts. ㊻ Though the elasticity of well constructed brickwork imparts to it some relief during violent vibration, there must be no looseness or absence of continuity and stiffness between the members of a brick structure. ㊼ The building must approach as nearly as possible the character of a solid mass having interior cells and hollows which do not interfere will its safe oscillation as a whole. ㊽ It would hardly be seriously contended that whatever the character of an earthquake-wave beneath it, an Egyptian pyramid, with its internal chambers, would rock and vibrate in separate sections. ㊾ In certain brick buildings in Japan which have been solidly constructed in one uniform block I find every indication that they have moved as a united whole, though I am willing to admit that there have been severe strains upon particular parts in order to produce such united oscillation.

㊿ An ideal model for a brick structure in an earthquake region I should take to be a continuous outer shell of equal height constructed of thick well-cemented brickwork, square or oblong in plan, (and if oblong not of too great a length) weakened as little as possible by openings, with frequent cross and transverse continuous brick divisions of comparatively equal strength bonded into the outer shell. (51) This would be tied horizontally with floors of homogeneous construction and of great tensile resistance, strongly united to the shell and to the interior divisions; and the top would be covered with a flat roof of similar construction. (52) Such floors and roof could be best constructed of stiffly framed steel joists with metal sheeting in between, firmly anchored to the walls, and filled in if necessary with light concrete. (53) Every projecting wing, bay, or turret forming a sudden change in continuity or uniformity of plan or mass, would constitute a defect in such a structure. (54) Also every pediment, parapet, or projection added to the top or face of such a building would present a point of seismic weakness. (55) Such a construction might be carried to a considerable height without greatly diminishing the security, except in so much that the amount of swing and consequent strain on the different parts would increase at increasing elevations. (56) In adopting a model of this kind, however, the architect is hampered by many other considerations. (57) The climate being one of heavy rains and falls of snow is entirely opposed to the use of flat roofs. (58) Buildings are required for a multitude of different purposes, and for different sites, and no fixed shape of plan can be uniformly followed for all buildings. (59) Whatever sacrifice

的ノ考ヲモ組ミ込ンデ耐震的構造ヲ施スト云フニ比較シテ往ツタナラバ却テ六ヅカシクアルマイカト考ヘマス

㊺木造家屋接キ手ガ自由ニ勝手ニ動ケルト云フ�part カラシテ今日之ヲ善シトスル理論アリトスルモ此理論ハ或ハ漠然タルモノデハアルマイカト私ハ窃ニ考ヘマスガ煉瓦家屋ノ特ニ安全ナル廉ハ処々方々ヲ万辺ナク繋イデ余リ其力ヲ不同ノナイモノニシテ往ク事デアラウト私ハ信シテ居リマス、

㊻勿論能ク築キ立テタ煉瓦壁ハ其弾力ノ御陰デ劇シイ地震ニモ余程夫レヲ堪ヘ忍ブ性質ヲ帯ビテハ来マスガ其レニタヨツテ一帯ノ連続ヲ欠イタリ個々相持チノ強サニ乏シキ様ナ積ミ方ハ決シテナリマセヌ、

㊼詰リ建物ト云フモノハ中ニハ空所ガアレトモ其空所ノ為メニ壁ノ力ヲ損スルコトナク全体ガ成ルダケ堅イ丈夫ナ一ツノ小手鞠(マリ)トナツテ安全ニ震動スル様ニ作ラネバナリマスマイ、

㊽彼ノ埃及ニアリマスル金字塔即チぴらみっどハ其内部ニハ室ヤ廊下ノ空所ガアルニモセヨ地震波動ノ種類ニ由テハ此塔ガ一ツノ物トナツテ動イテ往ク�part ハ出来ナイト云フ人ハアリマスマイ、

㊾日本ニ御坐リマスル或ル煉瓦ノ家屋デ先刻申上マシタ様ナ一ト小手鞠ノ様ナ性質ノ構造デアルモノニ付テ見マスルト是レハ一ツノモノトナツテ動イタ事ガ分ツテ居リマス、勿論是レガ一ツノ物ノ働キヲスル迄ニハ彼方ヘモ引ツ張リ此方ヘモ引ツ張ラレ其部分々々ニ付テ言ヘバ随分ヒドク地震ノ影響ヲ受ケタ事デアリマシヨウ、

㊿然ラバ地震国ノ煉化石造家屋ハドー云フ風ニシタラヨカラウカト云フニ単ニ理想上カラ推セバ外側ノ壁ハ何処迄モ能ク続ケテ居ツテ高サニ不同ガナク能ク揃ツテ居ル様ニシ、サウシテ壁ハ充分ニ宜イもるたるヲ使ツテ一ツノ物ニナル様ニ拵ヱ、夫レカラ地絵図ノ格構ヲ申上マスレバ真四角ナ状或ハ長方形……長方形ト云ツテモ余リ長クテハイケナイガ……先ヅソウ云フ状(カタチ)トシ窓ヤ入口ハ成ルベク少ナクシテ壁ヲ弱メヌ様ニシ、夫レカラ間仕切壁ヲ外側ノ壁程ナラズトモ力ノ余ル程ノ厚サトシテ此処彼処ニ設ケテ外側壁ヲ繋グナドノ事ガ最上ナ構造デアラウト思ヒマス、

(51)更ニ進ンデ申シマスレバ桁行ノ方モ充分ニ繋キ付ケル為メニ総体力ニ不平均ノナイ上ニ充分ニ引ツ張ル力ニ堪ヱル様ナ根太組ヲ内外ノ煉瓦壁ニ大丈夫ニ結ヒ附ケ夫レカラ屋根ハ不同ノナイ「ロク屋根」ヲ同様ノ構造トシテ設ケルノデス、

(52)偖今云ツタ目的ニテ床ヤ屋根ヲ拵ヱルノニ一番宜イ方法ハ鋼鉄梁ヲシツカリ組合ハシテ根太トシ之ヲ大丈夫ニ煉瓦壁ニ入レ込ミ根太ト根太トノ間ニハ鉄板ヲ張ルノデス鉄板ノ上ハ極ク軽イこんくりーとヲ敷キ込ムノデス、(53)夫レカラ角屋出張窓又ハ塔ノ類ハ其出ノ為メニ其所ニテ急ニ横ナリ縦ナリニ家屋ノ形ヲ変スル様ナモノデスカラ耐震工事ニハ宜シクナイモノデス、(54)又甍ヤ軒先キ壁其他ノ壁ノ上ナリ前面ナリニ拵ヱタ出張リト云フモノハ耐震工事カラ云ヘバ非常ナ弱点ノ所デス

(55)今申上マシタ様ナ構造ノ煉瓦石造家屋ナラバ軒高ハ随分高クシテモ左程差支ハナカラウト思ヒマス、勿論高サノ増スニ連レテ上部ノ震動モ増シ従テ諸処共ニ之ニ堪ヘル力ヲ余計ニ要スル訳デスガ夫丈ケノ事デス(56)然ルニ今云ヒマシタ構造法ヲ用ヰルニハ何モ差支ナク進ンデ往ケルカト云ヘバ随分実地建築スル場合ニハ外ノ事ガ段々ト出来テ来ルカラ寔ニ板挟ミニナツテ困ル場合ガアル、(57)又気候ノ如

of correctness in *style* an architect may make, he must impart some proportion and design to his erections, necessitating projections in plan and different heights in elevations. ⑹⓪ But I think that designers of solid buildings could not go far wrong in keeping some model such as I have described in mind, and following it so far as practicable; wherever the enunciated principles were violated he would have recourse to extenuating methods and precautions. ⑹① He might, for example, in cases where he cannot sacrifice turrets, pediments, or parapets, have recourse to wood, covered with metal or rendered in some way partially fireproof, or, by reducing the weights and projections of such features to a minimium, and giving additional security with iron and cement-work he might cautiously execute such portions solidly in a modified form. ⑹② Unable always to employ flat roofs and iron constructions, the architect might introduce important changes in the ordinary wooden framework used, eliminating as mush as possible any unequal thrust or strain upon the walls.

⑹③ I have previously briefly pointed out what I think to be a serious defect in the European roof as commonly constructed. ⑹④ The modern roof-truss is a scientific structure well designed to employ the least amount of material in the most scientific manner: but a *roof truss* is not a *roof*. ⑹⑤ It is generally considered sufficient for an architect to make a detail of each kind of truss for a building and accompany it with a general plan of the roof, showing the position of such trusses. ⑹⑥ Portions of trusses, which must occur in angles, their rigid connection with the rest, and the construction of numerous irregular portions, which exist in every complicated covering, are sometimes left to the contractor or clerk of works to fill in by a kind of rule-of-thumb, with the result that the roof as a whole is often a very unscientific structure indeed. ⑹⑦ There is little or no unity or stiffness in the completed structure, and violent shakings create all softs of unequal movements and undulations in its different parts. ⑹⑧ This is fully confirmed by observations in the earthquake districts.

⑹⑨ Though the ancient Japanese roof is a heavy, wasteful, and unscientific structure, it appears to me to possess certain advantages not generally present in the ordinary European roof; it is equally stiff in every direction, and is, in fact, a continuous united framework, and not, like the modern roof, a series of detached

キモ日本ノ如キ雨モ多ク雪モ多ク降レバ「ロク屋根」等ヲ用ヰルノハ宜シカラヌ事ニナリマス、⑸⑧夫レカラ家屋ハ元々(モト)建テル目的ニ由テ種々ノ種類ガアリ建築敷地モ様々デスカラ同ジ地絵図ノ格構ヲ以テ何時(イツ)デモ建テルト云フ事ハ中々行ハレマセヌ、⑸⑨其処デ先刻申シタ様ニ家ノ形状(ツリアヒ)ニ付テハ建築ノ流派ノ考ヘヲ棄テルニシテモ全体ノ釣合ヤラ意匠ヤラシテ拠ロナク地絵図ニハ壁ノ出入、立図ニハ軒ヤ屋根ノ高低ガ出来テ来マス、⑹⓪併シナガラ私ガ前ニ云ヒマシタ様ナ堅実ナシツカリシタ家ノ構造ヲ模範トモ標準トモシテ心ニ留メ事情ノ許ス限リハ之ニ則テ搆造スルト云フ事ハ敢テ法外ノ事デモアリマスマイ若シ又ソウ出来ナイ場合ニハ格別ナ注意モ施シテ往ク可ク軽イ構造則チ重量ヲ減スル方法ニ依テモ往カヌ事ハナカラウ⑹①例令バ軒先壁ナリ破風ナリ又ハ塔ナリガ軒上屋根上ニ作ラネバナラヌ必要ガ起ツタ場合ニハ之ヲ木デ作テ木造骨組トシ又防火ノ為メトシテハ夫レヲ金属ノ板デ張ルトカ或ハ漆喰塗等ニモナサン或ハ又出来ルダケ重量ヲモ減シ其出ヲモ少クシ其レデモマダ不安心デアルナラ鉄物ヤせめんとニテ丈夫ニ繋ギヲ取ラバ作リ方ガ違フノミデ破風ヤ軒先壁ノ出来ヌ事ハナイ考デアル、⑹②又「ロク屋根」モ鉄根太モ是レハ何ノ建築ニモ用ヰルト云フ事ハ出来マセンカラ小屋組ナリ床組ナリ是レマデ仕来リタル方法ヲ一変シテ煉瓦壁ニ来ル所ノ押出シタリ引張ツタリスル力ガドコデモ大小強弱ノ違ヒガナイ様ニ成ルベク作ラネバナラヌト思ヒマス、
⑹③私ハ西洋風ノ屋根ハ大層欠点ガアルト云フ考ヘガアリマシテ前ニ一寸其事ヲ述ベテ置キマシタガ⑹④今日我々共ガ用ヰテ居ル西洋風小屋組ト云フモノハ寔ニ学理ニ適フタ構造法デアツテ成ル丈ケ細カイ材料ヲ使ツテ出来ベキ丈ケ大キナ小屋組ニスルデアリマス、併シ小屋組ト云フモノト屋根ト云フモノハ一ツ物デナイ其間ニ区別ガアル、小屋組ハ則チ屋根ニ非ルナリ、⑹⑤我々カ仕来ツタ今迄ノ習慣ヲ申上マスルト建物ノ中所々違ツタ所ダケノ小屋組即チ小屋ノ組ミ方ヲ銘々一ケ所宛明細ニ図面ニ見ハシサウシテ其小屋組ノ配リ方即チ位置ヲ示シタル小屋ノ地絵図ヲ添ヘテ出セバ是レデ屋根ノ構造ハ敢テ差支ナイ十分デアルト思ツテ居タノデス、⑹⑥然ルニ此小屋組ノ中ニモ隅ニ往クモノガアルシ夫レカラ隅ニ往クモノヲ他ノモノトシツカリ繋ギ合ハセル所モアル其他入リ組ンダ小屋ニハ種々様々ナ構造モ出来ルノデスガ斯様ナ場合ニハドウスルカト云ヘバ先ヅ建築(ヤ)ノ受負人ナドニ一任スルカ又ハ場所掛ノ者ガ宜イ加減ニ遣ツテ往クト云フノガ今日迄ノ実況デアリマス⑹⑦斯ル有様デスカラ屋根全体カラ見レバ決シテ学理ニ適ツタ構造デナイモノガ往々アリマス、其結ハドウデアルカト云フト屋根ノ全体ガ丸デ先刻云ヒマシタ一様ナトカ又ハ堅牢ニ固マツテ居ル所ノ性質モゴザリマセヌ為メニヒドイ地震ナドヲ受ケタ時分ニハ諸方ガ勝手次第ニ別々ニ動キ出ス事ニナルノデス、⑹⑧之レハ今回ノ震災地ノ結果ヲ見レバ寔ニ明瞭ナ事デアラウト思ヒマス、
⑹⑨日本旧来ノ屋根ト申シマスルモノハ寔ニ学理ニハ合ハズ無闇ニ頭ヲ重クシテ入ラヌ材料ヲ使ツテハ有リマスガ此仕組ハ耐震ノ方ノ性質カラ云ヒマスルト欧羅巴風ノ屋根ノ構造方ヨリ立チ優ツタ事ガアル、夫レハ何カト云フト無闇ニ木ヲ四方八方ニ使ツテ十文字ニ組合シテ居ル為メ自然ト小屋ガ一ツモノニナツテ居ルカラ欧羅巴風ノ小屋組ガ

frameworks independently supported and lightly held together.

⑦⓪ Now I am inclined to think that a great deal of the injury imparted to the upper portions of brick buildings by the vibrations of wooden roofs could not result if they were so stiffly framed in every direction as to move in one mass. ⑦① The battering of tie-beams, pushing out pulling in of roof plates, and other contortions which have shove over stone cornices, pediments, and chimneys, could not have occurred to anything like the some extent if the roof trusses had been unable to act separately and had been part of a stiff united framework. ⑦② I therefore propose several important improvements in the construction of European roofs for this country, which consist chiefly in adding longitudinal framing and trussing so as to make the structure a continuously braced skeleton in every direction. ⑦③ Such changes would also render these constructions much more secure against wind pressure, which is often the cause of movement in the woodwork of a roof, producing cracks in the upper ceilings of buildings. ⑦④ Though calculations for wind pressure are always made in designing the individual truss frames, pressure upon the large surfaces of a roof between the trusses is rarely sufficiently considered in ordinary buildings.

⑦⑤ Another point to observe in the erection of brick buildings is the necessity if limiting as much as possible the widths and areas of openings both in external and internal walls. ⑦⑥ A thick brick structure may be rendered very weak by the introduction of enormous openings. ⑦⑦ The architect in Japan has to contend with a great prejudice for large openings, owing partly to the ancient styles of building having accustomed the people to moveable walls and degree of air and sunshine in interiors, amounting to what may be called an *outdoor life indoors*. ⑦⑧ I cannot find that the climate, which is by no means a dull one, demands such arrangements for lighting purposes. ⑦⑨ In the winter these large openings make a house unbearably cold and draughty. ⑧⓪ In summer they are desirable and pleasant upon the assumption that the inside temperature is as hot, or, which is often the case under a tile or metal roof, even hotter than the outside, and that it is necessary to introduce every breeze of outside air to cool or keep up a fancy of coolness. ⑧① In a structure whose walls are non-conductive and the interior of which is cooler by several degrees than the outside temperature, the case is different, and a moderate amount of wind, together with the absence of outside glare and heated reflection is far more productive of comfort and coolness. ⑧② Many very cool and comfortable Japanese dwelling rooms are arranged in *dozo* having a minumum of openings. ⑧③ With respect to internals walls, so necessary to stiffen

個々別々ニナツテ居テ別々ニ動クト云フ様ナ欠点ガナイノデス是レガ即チ日本ノ家屋ノ屋根ノ一ツノ利益デアリマス、

⑦⓪今度ノ地震デ煉瓦家屋ノ上部ガ木造小屋ノ震動ノ為メニ非常ニ害ヲ受ケテ居ルガ若シ此屋根ガ一ト小手鞠ニナツテ動ク様ナ工合ニ何方(ドチラ)ノ方向ニモ充分ニ結合シテ出来テ居ツタナラバ、サウ大変ニ害ヲ受ケヌデアツタラウト云フ考ヲ抱イテ居ル、⑦①今其上部ノ震害ノ有様ヲ申シマスルト小屋梁ヤ母屋ナドガドン々々衝キ当ツタリ敷桁ガ衝イタリ引ツ張ツタリ其他捻ヂツタリ曲ツタリスル働キガ起ツテ石ノ軒蛇腹ヤ甍ヤ烟突ヲ推シ落シタノデスガ之レガ今申上マシタ様ニ屋根ガ別々ニ動ケナイ様ニシツカリト一ツノモノニナツテ居リマシタナラバコレ程ナ破損ハ出来ナカツタ事デアラウト思ヒマス、⑦②夫レデ自分ノ考デハ将来欧羅巴風ノ屋根ヲ日本ノ土地ニ用キルニハ色々ノ改良ヲ施スガ宜カラウ其改良ハドウスルガ宜イカト云ヘバ桁行キ通リニ更ニ小屋組ヲ入レテ梁間ニ渡シタル小屋組ヲ繋キ屋根ヲ縦横一ツニ組合ハシタル骨組トスルノガ其重ナルモノデアラウト思ヒマス⑦③斯様ニ屋根ヲ構造シマスル時ハ啻ニ地震ニ耐エル方バカリデナク屋根ニ非常ノ風ガ当リマスル時分ニハ家根ガ震動ヲ受ケテ其為メニ煙突ニ損所ヲ生スル事ガ往々アルカラ其害ヲ省ク事ガ出来ルダラウト思フ、⑦④勿論此風ノ圧力ノ事ハ丸デ頓着セヌデハナイ、小屋組ヲ計画スル時ニハ其小屋組ノ間ニ受ケル風力ヲ度ツテ精シク計画ハ致シマスガ全体ノ屋根ガ烈風ヲ受ケテドウスルト云フ事ハ余リ是レ迄研究シタモノハ無イノデアリマス、

⑦⑤此外煉瓦家屋ヲ建築スルニ付テ一ツ充分ニ注意シナケレバナラヌ事ガアルト云フノハ窓ヤ入口ヲ内外ノ壁ニ明ケルニ付テハ其幅並ニ面積ヲ成ルベク小イサクスル様ニスベキデアル、⑦⑥若シ之レニ背キマスルト充分丈夫ニ出来テ居リマシタ煉瓦ノ構造物デモ大キナ穴ヲ明ケタ為メニ蜂ノ巣ノ様ナモノトナツテ大変其力ガ弱マツテ来ル、⑦⑦然ルニ日本デ建築ヲシテ往キマスルノニ甚ダ困ル事ガアルト云フノハ日本ノ人ハ今迄襖ヤ障子ナドデ塞グ所ノ大キナ明キノアル家ニ住ヒ付ケテ居ツテ明リヲ取リ空気ノ流通ヲ宜クスルト云フ方ノ考ニ傾イテ居ツテ所謂家ノ中ニ居ツテモ露宿ヲシテ居ル習俗デスカラ之ニ反スル風ノ家ヲ作ルニハ其習俗ニ抵抗シテ往カネバナリマセヌ⑦⑧一体日本ノ気候ハ決シテ霧ガ深イトカ鬱陶シイトカ何トカサウ云フノデナイカラコンナ明ケ広ケノ建築ニスル必要ハナイ筈デス、⑦⑨夫レカラ冬ノ寒イ時分ニハ斯ウ云フ大キナ入口ヤ窓ハドウ云フ結果トナル乎ト云ヘバ家ノ中ハ随分辛抱ノ出来ナイ程ニ寒ムイ風ガ吹キ込ンデ困ル、⑧⓪然ラバ夏ニナルト宜イカト云フニ是レ又決シテ宜クハナイ、今迄ノ日本ノ習慣デハ大変此ノ方ガ望マシイ事ニナツテ居ルガ其レハ考ヘ違ヒデアリマス夫レハナゼカト云ヒマスルト家屋ノ中ノ温度ガ屋外ノ温度ト少シモ異(カワ)ラナイヤラ或ハ又瓦葺、銅鉄葺ノ下ニテハ屋外ヨリ却テ熱イカラ外カラ風ヲ入レテ室内ヲ冷ヤサネバナラヌト云フ空想ヲ抱イテ居ルノデス⑧①私ガ之ヲ空想ト云ヒマス訳ハ若シ煉瓦ノ様ナ熱ヲ導ク性ニ乏シイ即チ不導熱質ノモノヲ以テ屋壁ヲ作レバ内側ノ方ガ外側ヨリ余程冷シイ事ニナル風入リモ頃合(コロ)ニスル事ガ出来ル日光ノ眩(マバイ)イ事ヤ光線ノ反射ナドヲ避ケル事ガ出来ル詰リ住フニ冷シクテ快適ガ多イ訳デス⑧②茲ニ善イ実例ガアリマス御覧ナサイ日

and strengthen a building, the architect is constantly met by the demand for large stage-like openings between rooms, to allow of extending accommodation, and the client, having subdued his architect on this point, finds out afterwards that he has thus destroyed both the comfort and “furnish-ablenss” of both chambers which his ideas of elasticity of accommodation have led him to sacrifice. ㉞ This is in addition to considerably weakening the building as a structure by compelling the substitution of wooden partitions or the alternative recourse to enormous trabeated openings in brick divisional walls.

㉟ The use of very large openings in brickwork, except in shop fronts and other indispensable situations, where special methods of construction will be followed, should be combated as much as possible.

㊱ A good deal very worthy of consideration has been written on the subject of arches in relation to earthquakes. ㊲ They undoubtedly form sometimes a point of weakness in buildings. ㊳ An arch in a building is the top portion of the rim or border of an opening and the part which is supposed to carry the weight of the superincumbent mass. ㊴ Before the brickwork is dry, all arches exercise this function, the upper walling being unable to support itself alone over the hollows during the execution; but after the brickwork is hardened the wall arches over narrow and medium sized openings became mere frames or borders, the superposed brickwork, after hardening, being able to hold itself together without the assistance of the arch. ㊵ In very wide openings there always remains a considerable strain upon the crown of the arch itself, its removal after a considerable period resulting in a sagging and cracking of the super incumbent brick work. ㊶ Of course the width of piers and abutments are all matters entering into such considerations. ㊷ The point I wish to observe however is the great difference between theory and practical results in this matter of the function of arches. ㊸ Theory tells us that every arch in a building is carrying the whole weight of the superposed mass upon its crown, which is converted into resultants of thrust along the curve of the arch. ㊹ Experience shows that many arches after a time are doing no work of the kind but are shrunk and loosened borders to openings which can be injured or removed without seriously affecting the stability of the upper structure. ㊺ The strength or weakness of any particular from of arch cannot be considered independently, being governed entirely by the size of the opening it spans in proportion to the remaining solid parts of the structure. ㊻ The strongest shape for the hole itself requires primary consideration. ㊼ Within certain reasonable limits I am inclined to favour the

本ノ土蔵造リノ家ハ其窓ヤ入口ガ少クナイニ拘ハラス此中ニ住フ人ハ夏分ハ至極冷カニ感ジテ木造ノ家ヨリ愉快デアルト云フデハアリマセンカ

㉝又間内壁建物ヲ丈夫ニスル事ニ付テハ極ク必要ナモノデアリマスルガ建築ノ依頼者ハ兎角多人数ヲ入レントスルノ考ヘヨリシテ室ト室トノ間ダニ芝居ノ舞台ノ様ナ大キナ入口ヲ拵ヱテ呉レト申ス事ガ屢アリマシテ之ニハ我々建築家ハ困リマス偖此ノ如キモノガ出来上ツタ所デ依頼者ガ始メテ其不都合ニ気付キマス廾(ソ)ハ大キナ入口ヲ付ケタ為メニ両方ノ部屋ガ部屋タル快適ノ性質ヲ失ナヒ且ツ家具ヲ置ク所モナクナツテ仕舞ツテ最初一ツノ部屋ヲ二ツニ伸バシタリ二ツノ部屋ヲ一ツニ縮メント思ツタ考ヘガ後ニハ間違ツタ考デアルト云フ事ガ分ツテ来テ後悔スルノデアリマス㉞此類ノ作リ方ハ啻ニ是等ノ不便利アルノミナラズ大層建物ヲ弱ハメルモノデアリマス、

㉟煉瓦石壁ニテハ大キナ窓入口ハ商店ヤ其他已ムヲ得ザル場合ニハ仕方モ御坐リマセンシ是ニハ特別ナ構造モアリマスガ、此他ノ場合ニハ飽ク迄モ論弁シテ成ルベク小サクセネバナラヌト思ヒマス、

㊱次ニハ此窓ヤ入口ノ上ニ掛リマスルあーち即チ迫持デアリマス迫持ハ地震ニ宜イカ悪イカト云フ事ニ就キテハ大分名説ガアリマスガ㊲之レハ到底丈夫デハナイ家屋ノ尤モ弱イ部分ナルニ相違ナイト私ハ考ヘマス㊳併シナカラ此あーちト云フモノハ御承知ノ通リ入口ヤ窓ナドノ明イテ居ル所ノ上ノ縁(フチ)ヲ拵ヱタルノデ有ツテ自分ノ上ニアル荷ヲ残ラズ引受ケテ居ルト云フ事ニナツテ居ル筈デス㊴所ガあーちハ何処デモ煉瓦石ガ充分ニ固マラヌ内コソ上ノ荷ヲ支ユル肝要ノ務ガアルニ相違ナイガ煉瓦壁ガ段々ニ固マツテ往キマシタ時分ニハモウあーちヲ取ツテモ上ノ煉瓦石ハ少シモ崩レナイ所ノ力ヲ持ツテ居リマス㊵最モ非常ニ大キナ入口デアリマスレバ其支ヘル所ノ荷量ガ多分デスカラ煉瓦壁積畢テ余程日数ガ経タ後デモ此あーちヲ取除ケバ上ノ煉瓦壁ガシワツテ崩レル㇀ニナリマス㊶又此あーちノ可否ヲ調ベマスルニハあーちヲ受ケマスル左右ノ柱ノ様ナ所ナドモ都ヘテ細カク考ヘテ往ガネバ決スル事ハ出来マイト思ヒマス、

㊷茲ニ諸君ノ御注意ヲ願ヒタイノハ理論上ト実際上ニ大変ニあーちノ働キ方ノ相違ガアルト云フ事デス㊸理論デ云フト先刻モ申シタ様ニ上ノ荷ガ残ラスあーちニ掛ツテ先始メニあーちノ絶頂ニ来テ夫レカラあーちノ曲線ニ沿フテ下ノ方ニ行クノデアリマス、㊹併シナガラ建築後時日ヲ経タタルあーちハ実際往々其働キヲナシテ居リマセヌ、時ヲ経タルあーちハ言ハヾ窓ヤ入口ノ縁(ヘリ)トナルバカリデ之ヲ取ツテ見タ所ガ上ノ構造物ノ堅牢ヲ害スルト云フ様ナ大シタ事ハナイ、㊺故ニあーちノ強弱ハ只単ニあーちト云フ構造ノミデ論シテ往ク事ハ出来マセヌ、㊻結局其強弱ハあーちノ明キノ大キサト其両脇ノ柱ヤ壁ノ大小広狭ニ由ルモノデアリマセウ、

㊼此訳カラシテ或ル限リマデハ能ク構造シタル煉瓦石ノ迫持ハ却テ楣(マグサ)ヲ用キルヨリモ宜カラウト私ハ思ヒマス、㊽木ヤ又ハ鉄ノ楣ハ其両端ガ震動ノ際連打(ツヽケウチ)ノ働キヲナシマスカラシテ大変ニ害ヲナシタ㇀ヲ実見シマシタ㊾其害ヲシタト云フノハ殊ニ両方ノ此柱ト柱トノ間ノ距離ノ長イ場合ガ甚シイ、㊿夫ハナゼカト云ヒマスルト例ヘバ楣(マグサ)ガ煉瓦柱

employment of well constructed brick arches rather than lintels for openings in brick-work. ㊽ Wooden and also iron lintels, I find, have done serious damage at their ends by the *battering-ram* motion what has been imparted to them. ㊾ This is when the piers between the openings are of moderate width. ㊿ In the case of lintels across very wide openings supported upon isolated piers of brickwork or cast iron, the tendency of the oscillating weight above is either to drag the piers over, or to snap them throught by a tremendous shearing force. (101) The formers result I shall refer to elsewhere as a *rhomboidal* displacement of parallelogramic forms, such as is constantly observable in the Japanese trabeated constructions. (102) The latter result has many illustrations, but notably that of the Nagaragawa bridge. (103) Given an example of a beam of wide span carrying heavy weight and supported at the ends on slender piers, corner diagonals might be added to act both as struts and braces at the angles. (104) On the one hand, the formation of a triangle prevents a *rhomboidal* movement of the parallelogram, and on the other hand pressure from above is conveyed to lower points in the piers. (105) Now the shape of head thus constructed is actually contained in the form of a semicircular or eliptical arch! (106) It must be admitted however that an arch presents very little resistance to tearing stain, and the use of iron bond above or across arches to add tensile strength is certainly desirable. (107) In using iron lintels alone I would prefer to make them a part only of a continuous iron frame running all round the opening, a device which may be likened to the use of a metal rim to strengthen the edge of a hole in glass or porcelain. (108) All these suggestions, however, are based upon the supposition that the brickwork is firmly united with adhesive mortar and not a pile of loose disconnected blocks as is often the case in scamped constructions.

ナリ又ハ鉄柱ノ上ニアリトシマシタ所デ楣ノ上ノ荷量ガ震動シダスト此柱ヲ引倒スノ働キモ起リ或ハ又両方ノ柱ヲ喰ミ切ル様ナ働キガ出来マス［第一図］(101)以上二ツノ働キノ中前者ノ結果ハ長方形ノ変形シテ菱形ニナルモノト申シマス之レハ震災地ヲ御覧ノ御方ハ分リマセウカ倒レ掛ツタ日本家ハ皆菱形ニナツテ居リマス、即チ長方形ノ変シタルモノデアリマス、(102)第二ノ働キノ結果ハ沢山例ガアリマスガ［第二図］殊ニ此最モ見易キモノハ彼ノ長良川ノ鉄橋ノ柱デアリマス実ニ見事ナ実例ガ出来テ居リマス、
(103)依テ考ヘマスレバ若シ長イ楣ヲ用ヰ之ニ大変ノ荷ヲ掛ケソウシテ両方ノ柱ガ不充分ナル大サナル場合ニハ此所ニ引張トモナリ支ヘトモナル様ニ筋違ヒヲ入レタラ宜カラン、(104)左スレバ此筋違ヒガ先三角形トナリマスカラ菱形ノ変形ヲ防キ又圧力ハ其輪郭ニ沿フテ柱ノ下部ニ下リマス、(105)此ノ如ク筋違ヒヲ入レマスレバ楣ノ下ガ恰モ半円形若クハ楕円形ニモナル訳デ長方形ノ如キ害ハアリマセヌ［第三図］(106)若シ私ガ鉄ノ楣ヲ用マスルナラバ其鉄楣ノ一部ヲ枠ニ作リ之ニテ窓ナリ入口ナリヲ取巻カント思ヒマス(107)是ハ丁度玻璃ヤ陶磁器ノ孔眼ノ縁(フチ)ヲ丈夫ニスル為ニ金属ノ環ヲ嵌メルト略ホ同様ナ事デアリマス、
(108)以上申シタル事共ハ煉化石ヲ充分ニ力ノアルもるたるデ積上ゲタル壁ト仮定シタル上ノ事デアリマシテ煉瓦ガ只層々重ツテ居ルト云フ様ナ壁ニハ応用ガ出来マセン、（以下闕出）

建築雑誌　65号　明治25(1892)年5月

○演　説

○各種建物ニ関シ近来ノ地震ノ結果（承前）

名誉員　コ　ン　ド　ル君演説
正　員　瀧　　大　吉君口訳
　　市　東　謙　吉氏速記

(109) When the architect is compelled to use wooden floors his brick buildings he encounters several difficulties to be contended with, and it is possible that these may be met in different ways. (110) Owing to the different elasticity of the two materials, wood and brick, much injury has been done to buildings, especially those with heavily weighted floors, by the movement of wooden

(109)爰ニ木造床組ノ事ヲ申シマシヨウ建築家ガ煉瓦石造ノ家ニ木造床組ヲ用ヒネバナラヌ場合ニ際シマスレバ色々ナ困難ガ起ツテ来マス(110)其訳ハ煉瓦ト木トハ弾力ガ違ヒマスカラ夫レガ原因トナツテ全体ノ建物ニ大変ノ害ヲ来タシマス殊ニ非常ニ重イ荷ノ掛ツテ居ル床ハ煉化石壁ニ接シ若クハ壁中ニ入ル所ノ梁ヤ又ハ梁受ケノ木ガ震動ヲ受クルヿモ大ナル訳デスカラ従テ全体ノ害モ甚シクナリマス、(111)

beams and wall plates entering or touching brick walls. ⑪① It has long been usual in Japan to place timber wall plates upon projecting brickwork so as not to weaken the walls by their insertion, but the principal beams have to be carried into the wall for support, and these have been moved in and out causing considerable damage. ⑪② One way proposed for combating this tendency is by resorting to the principle of separating the materials as much as possible one from the other.

⑪③ Now this separation or "play," in order to be effective, must I think be very considerable, especially in the upper parts of a building where the swing is excessive; if insufficient, such isolation merely converts the destructive force from a shoving to a battering one. ⑪④ It must also be remembered that the floors and roofs of a building act not only as coverings and supports for weight, but assist in tying together the opposite walls, and adding stiffness and strength horizontally, in much the same way as cross walls do vertically. ⑪⑤ A high wall which would scarcely stand against the wind as a boundary wall, will be comparatively secure if connected to a corresponding opposite wall by properly constructed floors and roofs. ⑪⑥ Moreover, in order to carry out completely the principle of separating the woodwork of the floors and roofs of a building from the brickwork, it must be entirely supported by interior framework isolated from the walls, and any function of tying the walls together is lost. ⑪⑦ The walls became practically high shells of brickwork without horizontal supports or connections. ⑪⑧ Buildings erected on these lines would require other important improvements to add to their strength and stability. ⑪⑨ In certain details I think that the principle of the isolation and separation of timber from adjacent brickwork may be followed advantageously. ⑫⓪ For the most part, nevertheless, I am in favour of applying to the wooden floors of a brick building the principles which I have enunciated for wooden roofs. ⑫① I attribute much of the damage observable, to the independence of the different parts of a wooden floor, especially of the heavy beams and detached wall plates in the ordinary double floor. ⑫② If European floors were all "framed" floors firmly bound in each direction so as to form a stiff continuous platform, like for example the desk of a ship, and tied or anchored longitudinally and transversely to the walls, then, though they would undoubtedly strain the walls during earthquake, they would do so more uniformly and could not exert anything like the capricious violence at certain points which has been observed in many instances.

⑫③ It is of course essential that all large beams should be allowed to weaken the walls which support them as little as possible, and it is on account of the large dimensions and weight necessary in timber floors, as well as of their excessive vibration, that iron is in every way preferable.

是レ迄ニ日本ニテ用ヒ居ル方法ハ煉瓦ノ壁ヲ弱メヌ目的カラシテ煉瓦壁ヲ積出シ其上ニ根太掛類ヲ置キマスルガ重モナル荷ヲ受ケル梁即チ二階梁ノ類ハ壁中ヘ積込ミマス此積込ノアルヨリシテ梁ノ内外ニ震動スル毎ニ壁ニ害ヲ与フル㕝ガ尠少デアリマセヌ⑪②此害ヲ防クノ一法トシテ近頃床ト壁トノ縁ヲ成ルタケ截チ切ルベシト云フ説ガアリマス

⑪③是ハ壁ト床ト別々ニ震動サセルト云フ考ヘデアルノデス如何ニモ斯様ニ相互ノ縁ヲ絶タバ其効ガアリマセウ殊ニ之ヲ家屋ノ上部ニ用ヒバ強震ノ際ニ其効ノ大ナルヲ見ン併シナガラ若シ此縁ノ切リ方ガ不充分デアリマスルト縁ガ繋ガル時ニハ押シタリ引張タリスル方ノ結果デスンダノニ今度ハ変シテ連打ノ働キトナリマス、
⑪④元来家屋ノ床ヤ屋根ハ啻ニ家屋ノ上掩ヒトナリ或ハ上ノ荷量ヲ支ヘルト云フ目的許リニ用ユルニハアラスシテ向ヒ合ヒノ屋壁ヲ繋キ付ケテ丈夫ニスル効モアリ又間仕切壁ガ外壁ヲ堅ニ繋クト同様壁ヲ横ニ繋キテ丈夫ニスルモノデアリマス⑪⑤地堺ニ設クル薄イキャシャナ煉瓦塀ノ風力ニモ堪ヘ兼ヌルモノニテモ床ヤ屋根ヲ適当ノ搆造トシテ向ヒ合ヒノ煉瓦塀ニ維カバ余程丈夫ニナリマシヨウ⑪⑥且又此床ヤ屋根ヲ壁ト絶縁セシムルニ完全ナラン㕝ヲ欲スレバ此床ナリ屋根ナリヲ屋壁ヨリ離シテ内部ニ建テタル木ノ枠組ニ組ミ合セネバナリマスマイ⑪⑦左スレバ全ク壁ヲ繋クト云フ㕝ハ丸デ無クナッテ実際屋壁ハ唯タ丈(タケ)高キ煉瓦ノ殻(カラ)トナル訳デアリマス⑪⑧ソハ兎モ角何レニシテモ地震国ノ建築ハ其強弱安危ニ就キテハ大ニ従来ノ搆造ニ改良ヲ施サネバナリマセン、⑪⑨煉瓦ト木材ヲ別々ニ離スト云フノ搆造法ハ或ル場合ニ於テハ用ヒテ其効ガアリマショウガ⑫⓪併シナガラ私ハ先多クノ場合ニハ前ニ述ベマシタル木造小屋組ト同一ノ構造法ヲ煉瓦石造家屋ノ木造床組ニモ適用イタシタキ考ヘデアリマス、⑫①震災ニ遭フテ家屋ノ傷ミタルハ多ク木造床組ノ各部ガ個々孤立ノ姿デアッタル為メナラント私ハ思ヒマス殊ニ大キナ梁ヲ架シ其下ノミニ梁受ケヲ入レタル普通ノ二重床(ダブルフロアー)ハ其重ナル原因デアッタモノト認メマス、⑫②若シ其西洋風ノ床組ノ組合セ床デアッテサウシテ縦ニモ横ニモ確(シッカリ)ト繋キ合セテ恰モ船ノ甲板ニ均シク一枚板ノ様ナ工合ニ出来テ居テサウシテ四方ノ屋壁ト離レヌ様ニ堅固ニ取付ケテアリマシタナラバ地震ノ際ニハ屋壁ヲ押シタリ引イタリスルノ害ハ免レザルトモ其害ハ屋壁全体ニ均一ニ渉ル訳デアリマスカラ彼ノ今回沢山実例ヲ遺コシタル或ル一部分ニハ軽ク当リ或ハ一部分ニハ重ク当ルト云フ様ナ「ムラ」ヲ生ズル事ハナカラウト考ヘマス、

⑫③左レバ大キナ梁ヲ用ユルトキ※4ニハ成ルベク壁ヲ弱メヌ様ニ取付ケルノガ肝要デアリマスソコデ木造床組ハ如何ト云ヘハ梁ノ寸面ヲ大キクセネバナラズ従テ荷量ガ重クナリ且ハ震動ガ劇シイ故ニ何カニ付ケテ鉄又ハ鋼鉄ヲ以テ作ル床組ガ最良デアリマス、

⑫④ Even a brief notice of the subject in hand would be incomplete without some reference to the matter of foundations. ⑫⑤ I cannot yet satisfy myself that any principles dictated by earthquake considerations have been discovered applicable to the foundations of solid and heavy buildings, which are opposed to the ordinary theories of stability followed in such works, though there is no doubt need for extra and special precautions. ⑫⑥ The suggestion of isolating a building by means of sunken areas from contact with the surface of the surrounding soil is an interesting one. ⑫⑦ It assumes as proven (and no doubt valuable experiments point to this conclusion), that the vibration on the general surface of the surrounding soil is greater than that on a sunken surface at a moderate depth below it; for it must be remembered that the base of a heavy building must finally rest upon and penetrate the ground beneath it, and that placing it in such an excavation amounts to adding so much more to the height of the walls of the building.

⑫⑧ To apply to heavy buildings the principle of separating the structure from its foundations by mean of interposed revolving bodies, if not impossible, is certainly attended with immense difficulties and objections. ⑫⑨ Personally, I should hesitate to attempt these methods even in very light buildings, because, in the first place, they would seriously conflict with considerations of ordinary strength and stability, and in the second place I have a strong conviction that they would not have the desired effect during severe earthquake. ⑬⓪ In all earthquakes seriously injurious to buildings there is a considerable vertical as well as horizontal movement. ⑬① Many buildings in Nagoya and Gifu *Kens* having their posts dowelled into stones have been lifted out of the dowel holes and moved off the stones. ⑬② To make such a ball joint system complete, from seismological considerations alone, the addition of springs to check the vertical motion would be required as well as revolving bodies.

⑬③ Undoubtedly the sliding of the ground beneath a structure relieves it of much of the horizontal *quantity* of an earth vibration. ⑬④ In certain buildings great strains are observable at a point just above the ground forming the junction with their imbedded foundations, and which have resulted in some cases in an opening of joints in the stone plinths, and a movement in the courses, often slightly rotatory in character. ⑬⑤ Such effects I have only noticed in the European wooden structures which have stone bases or plinths, and there is no case of similar effects in the heavier structures of brick. ⑬⑥ In scarcely any instance are there signs of damage or displacement in the lower portions of brick buildings, and I could find no indications of a severe wrench at the base, such as is observable in the lighter buildings and even in the stone *toro*. ⑬⑦ The forces of earthquake vibration are so terrific that the idea

⑫④今晩ノ演説ハ簡短ノモノデアリマスルガ地業ノ事ニ少シニテモ論及セネバ何ダカ事ガ足リナイ様デアリマスカラ之カラ聊カ述ベマシヨウ、

⑫⑤大厦高楼ヲ支ユルニ適スベキ堅牢ナル基礎ノ方法ハ今日迄地震上ノ研究カラシテ指教サレタル所ニテハマダ私ハ十分満足スル⺇ガ出来マセン勿論余計ナル強サヲ要シ特別ナル予防ヲ要スルニハ相違ナシトスルモ其説ク所或ハ普通ノ方法ト違ヒ家屋ノ安全ヲ欠ク如キ説モアル様ニ思ハレマス、⑫⑥地ヲ穿チテ其中ニ家屋ヲ建テ家屋ノ周囲ニ空濠ヲ遺コシ以テ之ヲ地ノ表面ト絶縁スベシト云フ地震学上ノ説アリ面白キ考デアリマス⑫⑦蓋シ此説ハ地震ハ地下ヨリモ地球ノ表面ニ於テ大ナリト云フ⺇ヨリ出テ〔但此空濠ヲ設クルヲ善シトスルノ結論ハ慥カナル試験ノ成蹟ニ基キタルヤ必セリ〕タルモノデアリマシヨウ否ラサレバ元来重大ナル建物ノ下底ハ深ク地下ニ入リ込ミテアルモノ故此建物ノ周廻ニ空濠ヲ設クレバ其建物ノ高サヲ更ニ増加スルノ訳トナリマシヨウ、

⑫⑧又弾丸ノ如キモノヲ基礎ト地ノ間タニ挟ンテ入レ以テ家屋ヲ地ト絶縁セシムルト云フ地震学ノ説ヲ重大ナル家屋ニ実行セントセバ一任(ヨシ)出来難キ⺇ニアラズトスルモ之ヲ施スニハ容易ナラサル困難モ起リマシヨウ不都合モ出来マシヨウ、

⑫⑨右ノ両法ハ軽量ナル建物ニモ私ハ少シク応用シ兼ネマス其説如何ト申セバ甲法ハ大ヒニ建物ガ具フベキ強サト安立トヲ妨ゲル様ニ考ヘラレマスシ乙法ハ劇震ノ際予期シタル良結果ヲ得ル⺇ハ決シテ出来難カラント深ク信シテ疑ヒマセンカラデアリマス、

⑬⓪抑モ建物ヲ害スル程ノ地震ニハ凡テ水平動ト上下動ノ度ガ随分強キモノデアリマス⑬①カラ彼ノ名古屋、岐阜辺ノ被害家屋ニ就キテ見マスルト礎石ニ柄(ホゾ)入レニナリタル柱ガ柄穴カラ飛ヒ出シテ礎石ヲ外レテ居ルノガ許多アリマシタ⑬②ガ若シ単ニ地震学ノ一点カラ此柱ト礎石ノ繋ギヲ満足ニナサントセバ丁度弾丸ヲ家屋ノ下ニ敷キナラベルト同様ニ弾機(バネ)ヲ入レテ之レニテ上下動ノ感シヲ減殺セントスル⺇トナリマシヨウカ、

⑬③建物ノ下ニ当ル地ガ建物ニ関係ナシニ動ケバ水平動ノ勢力ヲ殺グト云フ事ハ明白デアリマスガ⑬④或ル建物ハ其基礎ニ接シテ居ル部分ニシテ丁度地上ニ見ハレテ居ル接キ手ノ処ニ大変ナ震害ヲ受ケテ居マシタ往々側石ノ接手ガ口明キ或ハ建物全体ガ側石ノ所ニテ少シク回転シタル痕ヲ留メタノガアリマス、⑬⑤斯ウ云フ結果ハ唯側石ヲ具ヘタル欧羅巴風ノ木造家屋ニテ見受ケタバカリデアリマシテ煉瓦造リノ重イ家屋ニハ少シモアリマセンデシタ、⑬⑥煉瓦ノ家屋ニテハ其下部ノ震害ヲ被リタ痕迹ハ幾ンドナク彼ノ軽キ木造家屋ヤ石燈籠ノ其脚部ニ被リタル酷タシキ損傷ニ至テハ毫モ之ヲ煉瓦家屋ニ見受ケマセン、

⑬⑦地震ノ震動力ハ実ニ恐ルベキ強大無辺ノモノデアリマスカラ家屋自身ノ重サヲ以テ之ニ堪ヘントシ若クハ之ヲ減殺セントスルハ到底出来ルモノデハアリマスマイト然ルニ日本風ノ家屋デモ若クハ西洋風ノ家屋デモ其建築ノ最モ重ク出来テ居ル方ガ最モ震害ノ少ナカツタト云フノガ事実デ

of resisting or subduing them by mere constructed weight would be received perhaps with ridicule, but it remains a fact that in both Japanese and foreign buildings the heaviest in proportion to their height show least signs of basal disturbance. ⑱ The crust of the earth is an elastic substance and many soils are eminently compressible and elastic, therefore it seems not unreasonable to suppose that if earth undulations meet with a heavy resistance at certain points they may be to some extent neutralized or diverted to neighbouring points where less resistance exists. ⑲ In the Neo Valley, where the convulsion was so terrible as to throw farmers' dwellings forward a distance of five or six feet, certain houses screened by low hills remained uninjured, the weight of the hills having apparently diverted or neutralized the earth movement.

⑳ All loose-made ground appears to be subject to fearful mashing and mauling during violent earthquakes, and this point has to be specially kept in mind, in addition to the mere supporting power of such soils, when building in earthquakes countries. ㉑ Artificial foundations of piling and concrete seen to require special precautions to be taken. ㉒ As long piles in very loose soil may tend rather to increase the vibration beneath a structure they should be dispensed with when not absolutely necessary. ㉓ In all cases their heads should be united by a stiff platform or framework. ㉔ With concrete foundations unusual strains and cross strains, in addition to those produced by the mere weight of the superposed building, require consideration, and extra thickness as well as in all cases the use of well-hardening material seems desirable.

㉕ After studying the effect of the earthquake upon different kinds of wooden buildings, putting on one side the massive monumental structures, I find that those of so-called European construction have undoubtedly fared best. ㉖ This is to be accounted for by the extra number of posts, quarters, and ties, the addition in many cases of diagonals, the use of continuous cills, the stronger methods of jointing, and the general stiffness and box-like character of the whole. ㉗ In the ordinary Japanese structure the great distance between two pillars, the heavy horizontal ties above them, the deep jointing of these into the slender posts, the absence in many cases of continuous ground cills, and above all the total want of diagonals, unite in producing a very weak and rickety structure: certainly such framework was never designed with any idea but that of supporting its own undisturbed weight! ㉘ Street after street of leaning and fallen houses in Nagoya sufficiently testify to the justice of this conclusion. ㉙ One point in favour of the purely Japanese construction, and which certainly appears to be a triumph for those who advocate principles of structural disconnection (or what I may vulgarly term "hinging,") is, that the upper stories of two-storied buildings in many cases remain whole and vertical while the lower stories have leaned or fallen. ㉚

アリマス、
⑱依テ考ヘテ見マスルニ地球ノ表皮ヲナシテ居ル土ハ弾力性ノアルモノニテ且其多クハ随分伸縮ノ度モ強クアリマスカラ若シ地震波動ガ地面ノ或ル処ニ於テ重イ荷量ノ抵抗ニ出会フタナラバ多少其力ヲ減殺サルヽカ若クハ抵抗最モ少キ所ニ其勢力ヲ転スルナラント想像スルモ敢テ不当デモアリマスマイ、
⑲彼ノ根尾谷ハ特ニ劇烈ナ震動ノアツタ土地デアリマシテ或ル百姓家ノ如キハ五尺モ六尺モ前ノ方ヘ飛ビ出シテ居リマスル程ナルニ同ジ土地デモ低イ山ガ障塀トナツテ居ツタ家屋ハ其害ヲ受ケテ居リマセン蓋シ其山ノ荷量ニ由テ震動ヲ他ヘ転シタルモノト見ヘマス、

⑳凡ソ柔軟ナル埋立地ハ劇震ノ際ニハ大変ヒドク揉ミ崩サレル様ニ見受ケラレマス故ニ地震国ノ建築ニハ此類ノ土地ノ唯上量ヲ支ユル力バカリヲ考ヘズニ此作用ヲモ併セテ考ヘニ入レル㆓ハ極ク大切ナ事デアリマス、㉑左レバ杭打地業トこんくりーと地業ニ大層注意ヲ要セネバナラヌト思ヒマス㉒若シ極ク軟カイ土地ニ長イ杭ヲ打ツトシマスレバ其長キガ為メニ地下ニテ余分ノ震動ヲ受ケルデアリマシヨウ故ニ斯様ナ土地ニハ極ク必要ナル場合ノ外成ルベク長イ杭ヲ打タヌ方ガ宜イ㉓ソウシテ杭打地業ナラバイツデモ捨算盤ヲ架ケ渡シテ杭頭ヲ聯結スベキ事デアリマス㉔更ニこんくりーと地業ニ就キテ申シマスレバ通法ハ只上ノ荷ヲ受ケル丈ケデ有リマスガ地震ノ際ニハ色々ナ烈シイ働キヲ受ケ或ハ横ニ引キ切レル様ナ事ガ起リマスカラ此考ヘヲ以テ厚サヲモ増シ粘結善キ材料ヲモ用ヒネバナラヌト思ヒマス、
㉕木造家屋ニ就テ地震ノ結果ヲ能ク能ク調ベテ見マスルニ神社仏閣ノ様ナ例外ナル大建物ヲ退ケテ論ジマスルト所謂西洋風ニ出来テ居リマスル木造家屋ガ一番害ガ少シデアリマシタ、㉖其少ナカツタ原因ハ西洋風ノ家屋デハ柱ヤ又ハ間柱、夫レカラ繋ギヲ使ヒ筋違ヒヲ入レ土台ヲ柱ノ下ニ残ラズ指シ回ハシ其他全体ノシツカリトシタル組方等デ結局全体ガ箱ノ様ニナツテ居タ是等ノ搆造法デアリマシヨウ㉗之ニ反シ普通ノ日本ノ建家ハ柱ト柱ノ間ガ非常ニ明イテ居ツテ上ニ重タイ梁カ載ツテ居ル此等ノ大梁ハ細長イ手弱キ柱ニ差合セテアルノデス土台ハ一面ニ差廻ハサヾル方却テ多ク加ルニ筋違ヒハ皆無デアリマス此数廉ノ欠点ガ相合シテ大変ニ薄弱ナル原因ヲナシマシタ此ノ如キ搆造ノ家屋ハ家屋自身ノ荷量ヲ支ユルダケノ目的ニテ作ラレタルモノニテ少シモ他ノ働キヲ考ヘナカツタモノトホカ思ハレマセヌ、㉘現ニ名古屋ノ市街ニテハ到ル処倒レ掛ツテ居ル家屋ヤ或ハ潰レテ居ル家屋ガ其実例ヲ示シ私ノ論定ヲ証シマシタ、
㉙爰ニ只一ツ純粋ナル日本風ノ搆造ノ中ニ宜ササウナモノガアル是レハ日本風家屋搆造ノ保護論者ガ金城鉄壁ト頼ム所デアラウト思ハレル所ノモノデ至テ俗語ナガラ私ハ独リ之ヲ蝶番ヒ作リト名ケテ居ルモノデス是レハ外デモアリマセン二階家ノ下階ガ曲(ユガ)ンタリ倒レタリシテ居ルニ其二階ハ依然トシテ直立シテ居ル事デアリマス㉚蓋シ日本造リノ二階家ノ階上階下面積ノ同一ナルモノハ少クモ隅々ヤ重

It is I believe the custom in Japanese buildings having an upper story corresponding in area with the lower, to carry at least the principal posts continuously through from top to bottom in one piece, but in many double-floor buildings the upper story is smaller than the lower one and is set back, necessitating the construction of a more or less detached framework above. ⑮① It is in the latter class of buildings that the result 1 allude to has taken place. ⑮② Accompanied by a yielding and collapse of the lower storey, this curious result can scarcely be considered a very beneficial one, but it may reveal a principle capable of more profitable application. ⑮③ It might prove to be an advantage in wooden framed buildings to keep the posts of one story independent of those below, fastening them only to the cross plates and thus breaking the vertical continuity of the structure, in such a way that a double story house would resemble two boxes fastened one above the other. ⑮④ But a little consideration shows that the effect alluded to in Japanese buildings is only consistent with a *rhomboidal* displacement of the lower walls, and without this the "hinging" movement which leaves the upper storey perpendicular (like the lamps in a ship's saloon) cannot possible occur. ⑮⑤ A wooden framework containing immovable triangles of bracing and with strong joints may be violently shaken, tossed, slid, or even upset as a whole, and serious strains may occur in its parts, but it is impossible for it to assume what I have called a *rhomboidal* displacement, such as I may liken to the collapse of an old and rickety chair. ⑮⑥ In thus referring to the purely Japanese buildings I have done so entirely from a seismological point of view. ⑮⑦ Their adaptability to the slender means and the simple wants of the poorer classes, and their suitability to the climate, I have not attempted to discuss. ⑮⑧ Their elegance of style and artistic attractions so fascinating to us all, have not been pleaded, but it must be admitted that I have been equally vandalistic in regard to European styles. ⑮⑨ The Architect of modern days must be a scientist first and an artist afterwards; he must at any rate be content to be so in a country subject to earthquake convulsions.

ナル所ダケニハ建テ登セ柱ヲ用ユルノ例ナルガ二階ノ面積第一階ヨリ少キ造リ方アリテ是レハ二階ノ表ガ下階ノ外ヨリ引込ムユヘ自ラ多少別々ノ建方トナリマス⑮①私ガ申ス如キ蝶番ヒノ結果ヲ生シタルハ則チ此建方デアリマス、
⑮②下階ガ曲(ユガ)ンダリ倒レ込ンダリスルトキ之ニ伴ツテ生ス此奇妙ナ結果ハ別段ニ利益ガアリトハ言ヒ兼ヌルモ併テ其事実ハ自ラ之ニ優リテ利益アルベキ搆造法ノ道理ヲ指示シタル様デアリマス⑮③依テ私ノ考デハ木造ノ二階家ヲ建テルナラバ二階ヘ下ノ柱ヲ透(ト)フサナイデ二階梁ノ処デ之ヲ切リ上ハ上、下ハ下、ト上下別々ニ動ク様ニシタナラバ丁度函ガ二ツ重ナル様ナ工合ニナツテ随分宜カラウ様ニアリマス、⑮④併シ少シク考ヘテ見マスルト其日本風家屋ニ見ル所ノ結果ハ其階下ノユガミ、傾キニ相伴フモノデシテ此階下ノ変形セサル限リハ上階ヲ直立ナラシムベキ（恰モ船中ノらんぷト同様）蝶番ヒノ働キハ出来兼ヌルト云フ事ガ分ツテ来マス、
⑮⑤木造家屋ノ全体ニ筋違ヲ入レ三角形ニ致シテ何レノ部分モ変形セヌ様ニ作リソーシテ接キ手ガ充分ニナツテ居レバ地震ノ際ニハ全部ノ震動モ猛烈トナルベク、一塊ノモノトナツテ投ゲ出サレントモスベク加ルニ其各部ノ震動ニ抵抗スル苦シミモ大変多クナランガ彼ノ遣イ古ルシタル手弱キ椅子ガ潰レル様ニ菱形ニ変形シヨウハアリマスマイ、
⑮⑥以上日本風ノ家屋ニ付テ申マシタ事ハ全ク地震ノ一点カラ観察シタルダケデ⑮⑦其搆造ノ簡易ニシテ下流社会ノ簡単ナル住居ニ適応スル事ヤ又ハ日本ノ気候ニ能ク適シテ居ルト云フ様ナ事ニハ固ヨリ論及シマセナンダシ⑮⑧サウシテ又其優美尚ブベク風雅愛スベキ建築ノ事モ論題外ニ置イタノデス尚ホ又此点ニ就キテハ西洋風ノ建築ニ於テモ同様ニ美術的ノ考ヲ脇ニ除ケテ論シタノデアリマスカラ左様御承知ヲ願ヒタイ、
⑮⑨要スルニ今日ノ建築家タルモノハ第一ニ理学者デアリ第二ニ美術家デアル様ニスルノガ必要デアリマスガ兎ニ角地震国ニ於テハサウアラネバナラヌ事デアラウト云フ考デ御座リマス、　（完）

会長辰野金吾君　コンドル氏ノ御演説ニ付キテハ随分諸君御議論モ御座リマシヨウガ時間モ最早少シデスカラ成ルベク速ニ御質疑御論評ヲ願ヒマス
新家孝正君　今ノコンドル先生ノ御演説ハ実ニ貴重ナル御演説デ一同有難ク拝聴致シマシタ、此震災ノ研究ニ付キマシテハ我造家学会々員諸君一同ガ御研究デ御座リマシタ、又他ノ会社他ノ学者先生方モ矢張地震ニ付テ非常ナル勉強ヲ以テ研究サレタ所デゴザリマス、然ルニ其説ガ一定シテ居リマセヌノデ実ニ我々如キモノモ頗ル迷ヒヲ持ツテ居リマスル、又我々建築社会ノ外ノ人ニ取リマシテハ別シテ甲ノ説乙ノ説ト区(マチ)々デゴザリマスル故ニ何レヲ取ツテ宜イヤラ之ニ迷フテ居ル而已ナラズ一番脳髄ニ浸ミ込ンデ居ルノハ煉瓦家屋又ハ石造家屋ハ地震ニ不適当ナモノダト云フ研究ヲ尽サナイ所ノ説ヲ信用シテ居

リマスル、若シ此侭デ経過シテ参リマスルト我日本国ニ非常ナル損害ヲ醸スカモ知レマセン、然ルニ此際ニ当ツテコンドル先生ガ貴重ナル御意見ヲ陳ベラレマシタノハ我々ニ取ツテ実ニ価値高キ御演説ト云ハナケレバナリマセン、依テ今晩此処ニ集マリマシタル諸君ハ満堂一致ヲ以テ会長ヨリコンドル先生ニ懇篤ナル御礼ヲ願ヒタイト思ヒマス、併セテ瀧君ニ向ツテ通訳ノ労ヲ謝シタイト思ヒマス、ドウカ諸君御賛成アラン㆓ヲ希望致シマス、

会長辰野金吾君（コンドル君ニ向ヒ）出席員一同ニ代リ深ク今晩ノ御演説ヲ謝シマス（更ニ瀧君ニ向ヒ）通訳ノ労一同ニ代リ鳴謝致シマス

コンドル君　新家君ノ御発議及ヒ諸君ノ御謝意共ニ謹ンデ鳴謝致シマス尚ホ瀧君御通訳ノ労ハ深ク謝スル所デアリマス

注

※１　英文側では改行があるが、和文側では改行のないことを示す。

※２　以下、数箇所で“煉化”とあるが、原文のままとした。

※３　原文では“名右屋”とあったが“名古屋”に改めた。

※４　原文では“　”とある。